

# GEO TIMES

Professional News Magazine



**July-Aug. 1958**

Volume III, No. 1

Published by the  
American Geological Institute



**SATISFIES THE MOST EXACTING REQUIREMENTS**

**RESEARCH POLARIZING MICROSCOPE**

# **DIALUX-POL**

The new LEITZ DIALUX-pol is the most advanced, universal polarizing research microscope ever manufactured. It was designed for the geologist, mineralogist, petrographer, paleontologist, and the industrial research microscopist.

The DIALUX-pol maintains the principle of interchangeability, famous with all LEITZ precision instruments, so that it is readily used for transmitted light as well as for reflected-polarized light. With the simple addition of a connecting bar, it provides synchronous rotation of polarizer and analyzer.

In addition to a built-in light source and condenser system, the DIALUX-pol features many other operational advantages: unique single-knob control of both coarse and fine adjustment by alteration of the stage height (and not the tube), thus focusing with maximum operational ease.

Within seconds, the DIALUX-pol, through LEITZ accessories, converts for photography (through combined monocular-binocular tube and Leica camera), for ore microscopy (through vertical illuminator), or will accommodate the LEITZ Universal Stage, Sodium Vapor Lamp, and other facilities.



- monocular or binocular vision
- combination tube FS for photography
- synchronous polarizer-analyzer rotation upon request
- dual coarse and fine focusing
- built-in light source; 6-volt, 2.5-amp, variable intensity
- vertical illumination for ore microscopy
- polarizing filters or calcite prisms
- adaptable to all universal stage methods

Send for the DIALUX-pol information bulletin—then see and examine this fine instrument for yourself.

**E. Leitz, Inc., Department 61-7  
468 Fourth Ave., New York 16, N. Y.**

Please send me the LEITZ DIALUX-pol brochure.

Name

Street

City  Zone  State

**E. LEITZ, INC., 468 FOURTH AVENUE, NEW YORK 16, N. Y.**  
Distributors of the world-famous products of  
Ernst Leitz G. m. b. H., Wetzlar, Germany—Ernst Leitz Canada Ltd.  
**LEICA CAMERAS • LENSES • MICROSCOPES • BINOCULARS**

# Calendar

Cooperation of Society Secretaries in supplying meeting notices for GEOTIMES calendar is requested.

- Aug. 24-30, 1958—INTNTL. CONGRESS OF PREHISTORY & EARLY HISTORY, Hamburg, Germany. For information write: Professor Gerhard Bersu, Frankfurt-am-Main, Palmengartenstrasse 10-12.
- Aug. 26-28, 1958—SYMPOSIUM ON PROBLEMS OF THE LAHONTAN BASIN, spon. by Sigma Xi Club of Univ. of Nevada, on campus, Reno, Nevada.
- Sept. 2-4, 1958—SVP: Annual Meeting with SSE, University of Michigan, Ann Arbor, Mich.
- Sept. 2-5, 1958—NINTH ALASKAN SCIENCE CONF., Univ. of Alaska, College, Alaska.
- Sept. 9-11, 1958—ASCE-AMS: Jointly sponsoring the Second National Conference on Applied Meteorology: Engineering, Ann Arbor, Mich. Write: D. J. Portman, 5500 East Engineering Bldg., Univ. of Mich., Ann Arbor, Mich.
- Sept. 17-19, 1958—AIME: SOC. OF MINING ENGRS. Rocky Mountain Mins. Conf., New-house Hotel, Salt Lake City.
- \*Sept. 27-Oct. 5, 1958—GEOLOGICAL SOC. OF VIENNA, 50th anniversary: meetings and field trips. Write: the Society at the Geological Institute, Univ. of Vienna.
- Oct. 5-8, 1958—AIME: SOC. PETR. ENG., Ann. Fall Mtg., City Coliseum—Rice Hotel, Houston, Texas.
- Oct. 9-11, 1958—OPTICAL SOC. OF AMER., Ann. Mtg., Statler Hotel, Detroit, Michigan.
- Oct. 13-16, 1958—SEGP: 28th Ann. Meeting, Gunter Hotel & Municipal Auditorium, San Antonio, Texas.
- Oct. 16-17, 1958—AIME: Southern California Petroleum Sect. Fall Meeting, Biltmore Hotel, Los Angeles.
- \*Oct. 20-23, 1958—SEVENTH NATIONAL CLAY CONFERENCE, U.S. National Museum, Washington, D. C. Field trip Oct. 20 to areas in NE Maryland and northern Delaware.
- Oct. 22, 1958—AAPG, Southwest Regional Meeting, sponsored by SW Fed. of Geol. Socs., City Auditorium, Mineral Wells, Texas.
- Oct. 23-25, 1958—AIME: Mid-America Minerals Conference, Chase-Park Plaza Hotels, St. Louis.
- Oct. 27-29, 1958—GULF COAST ASSOC. OF GEOLOGICAL SOC'S., Ann. Mtg., Corpus Christi, Texas.
- Nov. 6-7, 1958—AAPG: PACIFIC SECT. Ann. Mtg., Ambassador Hotel, Los Angeles, Calif.
- Nov. 6-8, 1958—GSA: ANNUAL MEETING, St. Louis, Mo. Also SECG, SVP, PS & AGT.
- Aug. 30-Sept. 12, 1959—INTERNATIONAL OCEANOGRAPHIC CONGRESS, AAAS, UNESCO & ICSU special committee on oceanic research cooperating: United Nations Bldg., N.Y. Write: Dr. Mary Sears, Woods Hole Oceanographic Institution, Woods Hole, Mass.
- \*Aug. 6-12, 1960—XIX INTERNATIONAL GEOGRAPHICAL CONGRESS, Stockholm, Sweden. Symposia and excursions will be held in the five host countries before and after the Stockholm meeting.
- \*Aug. 15-25, 1960—XXI INTERNATIONAL GEOLOGICAL CONGRESS, to be held at the Mineralogical Geological Museum of the University of Copenhagen in Denmark. Field trips before and after the meetings.

## 1958 SCHEDULE OF FIELD TRIPS

For additional field trips held in conjunction with meetings, see those items marked with an asterisk under meeting calendar.

- June 20-22—MICHIGAN BASIN GEOL. SOC., Escanaba, Mich. Field trip in the East Menominee iron range.
- July 23-26—WYOMING GEOL. ASSOC., Casper, Wyo. To Powder River Basin. Guidebook.

- Aug. 14-16—BILLINGS, MONT., Geol. Soc. 9th Ann. Field Conf., to Bear Tooth Mtns. immediately north of Yellowstone Park. Reservations (until Aug. 1) must include \$25.00 registration fee. Write: Publicity & Reservation Comm., Box 1982, Billings, Mont.
- Aug. 20-23—ALBERTA Soc. of Petr. Geol., Calgary, Alta. Field trip to Front Range Canadian Rockies. Guidebook.
- Aug. 21-24—SOCIETY OF VERTEBRATE PALEONTOLOGY, Field Conference on the Cenozoic of Western Montana will begin with meeting at Missoula; sponsored by Montana State University. Write: Albert E. Wood, Dept. of Biology, Amherst College, Amherst, Mass.
- Sept. 5-6—FRIENDS OF THE PLEISTOCENE, Rocky Mtn. Sect., field trip in Jackson Hole area of NW Wyoming. Write: John Montagne, Dept. of Geog. & Geol., Montana State College, Bozeman, Mont.
- Sept. 10-13—INTERMOUNTAIN ASSOCIATION OF PETROLEUM GEOLOGISTS, 9th Ann. Field Trip, Paradox Basin of SE Utah. Moab to Monument Valley & Aneth areas. Write: P.O. Box 34, Salt Lake City, Utah.
- Sept. 17-20—KANSAS Geol. Soc., Wichita, Kansas. To south central Colorado. Write: 508 East Murdock, Wichita, Kansas.
- Sept. 18-20, 1958—ROCKY MT. ASSOC. OF GEOLOGISTS Field Trip, Maroon Basin of N.W. Colo., to be held in conjunction with Colo. Pennsylvanian Symposium guidebook presentation. Date is tentative.
- Oct. 4, 1958—UTAH GEOLOGICAL SOC., Ann. Field Trip to Stansbury Range. Write: 200 Mines Bldg., Uni. Utah, Salt Lake City, Utah.
- Oct. 11-12—NEW ENGLAND INTERCOLLEGIATE GEOLOGICAL CONF., New Haven and southern Connecticut. For details write: John B. Lucke, U-45 Storrs, Conn.
- Oct. 16-18—NINTH ANN. FIELD CONF., to Black Mesa Basin of NE Arizona. Sponsors: New Mexico & Arizona Geol. Soc's. Guidebook. For information write: Richard D. Holt, P.O. Box 1116, Roswell, N. M.
- Oct. 27-29—GULF COAST ASSOC. of Geol. Soc's., Corpus Christi, Tex. Trip as conducted by Corpus Christi May 15-17.

## G.S.A. 1958 ANNUAL MEETING

St. Louis, Missouri—November 6-8, 1958

### LOCAL COMMITTEE

- General Chairman.....Carl Tolman  
Vice-Chairman.....Victor T. Allan  
Treasurer.....Kenneth G. Brill, Jr.  
Program Chairman.....Raymond E. Peck

### SUB-COMMITTEE CHAIRMEN

- Annual Dinner and Smoker.....H. Leroy Scharon  
Luncheons.....Oliver R. Graue  
Exhibits.....Paul R. Shaffer  
Sessions Rooms and Equipment.....James C. Brice  
Bulletin Boards and Communications.....Albert J. Frank  
Ladies' Entertainment.....Dorothy J. Echols  
Mrs. George W. White  
Publicity.....Arthur B. Cleaves  
Field Trips.....Thomas R. Beveridge, John C. Frye  
Registration and Information Norman S. Hinchey  
Harold P. Merry

### THE McLEAN PALEONTOLOGICAL LABORATORY

CARD CATALOGUES OF FORAMINIFERA, OSTRACODA, AND HOLOTHURINUM SCLERITES AVAILABLE BY SUBSCRIPTION; OTHER CARD CATALOGUES PENDING, OR CREATED BY SPECIAL AGREEMENT OR ON CONTRACT FOR OIL COMPANIES OR RESEARCH INSTITUTIONS. MICROPALEONTOLOGICAL RESEARCH AND TRAINING PROGRAM OFFERED.

SPECIAL SERVICES FOR OIL COMPANY PALEONTOLOGISTS AND STRATIGRAPHERS, INCLUDING SPECIALIZED DATA COMPILATIONS.

P. O. Box 916, Alexandria, Virginia, U.S.A.

# FRANTZ ISODYNAMIC Magnetic SEPARATOR

## NOW—made with BUILT-IN RECTIFIER

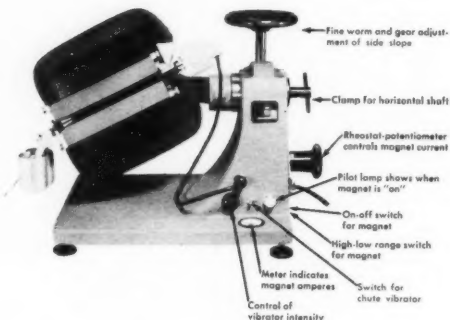
Silicon rectifier inside the base replaces external rectifier formerly required at extra cost. This is equivalent to a 7% price reduction for the entire outfit since price of separator remains the same. Rectifier control as well as those illustrated above contained in the base.

### S. G. FRANTZ CO., Inc. ENGINEERS

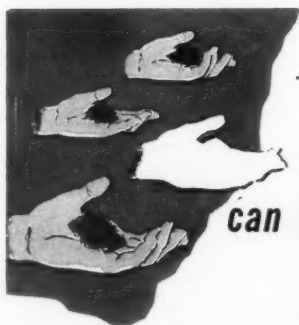
P.O. Box 1138, Trenton 6, N. J., U.S.A.

Cable Address:  
MAGSEP, Trentonnewjersey

ISODYNAMIC is the name that identifies the only Magnetic Separator of this type that is self-contained. In the massive cast iron base are located all the necessary switches as well as the magnet and vibrator controls. The ISODYNAMIC provides the ultimate in convenience and ease of operation.



Inclined Feed. Vertical Feed Attachments Available.  
Send for BULLETIN 137-I



... the sand sample that can't be identified  
when it reaches the lab—

## THIS handful of sand can cost you thousands of dollars!

... the sample that *could* influence decisions concerning future development of an entire field—the sample that is lost forever . . . because of a faulty container.

Sand samples are important. They cost at least \$2.00 each to collect and process. Yet up to 25% are dumped uncut because of illegible tags or inferior bags. Lost is the investment in handling costs. Forever lost is valuable information. Stop such losses with HUBCO PROTEXO SAND SAMPLE BAGS.

We'd like to tell you the whole story behind HUBCO Protexo Bags. For more information, a sample and dealer's name, mail in the coupon.

- PROTEXO BAGS**
- Strong • Sift-proof
  - Geologist-designed
  - Highest Quality Cambric Cloth
- MAGIC MARK TAGS**
- Water-Insect-and Mildew-proof
  - Guaranteed to keep even ordinary pencil markings legible.



HUBCO Protexo Bags  
were designed with  
the GEOLOGIST in mind.

HUTCHINSON BAG CORPORATION  
P. O. Box 868, Hutchinson, Kansas

Dept. G-T

Name \_\_\_\_\_  
 Company \_\_\_\_\_  
 Street \_\_\_\_\_  
 City \_\_\_\_\_ State \_\_\_\_\_



# This Month in GEOTIMES



Professional News Magazine

Published by **THE AMERICAN GEOLOGICAL INSTITUTE**

**Robert C. Stephenson,**  
EDITOR

**Kathryn Lohman**  
CIRCULATION MANAGER

VOL. III, No. 1

JULY-AUGUST, 1958

Can He Meet the Challenge? The Future of the Exploration Geologist by Raymond D. Sloan.....	6
We Must Face the Facts! by B. W. Beebe.....	8
Count Down for the Moon by R. Space Heater.....	9
Dinosaurs Meet the People.....	10
Geology Down Under by B. W. Collins.....	12
AGI Data Sheet 7: Roundness of Sedimentary Particles .....	15
French Colloquium by Roger H. Charlier.....	17

## AMERICAN GEOLOGICAL INSTITUTE

### Officers

**PRESIDENT**  
J. V. Howell  
**VICE PRESIDENT**  
Paul L. Lyons  
**PAST PRESIDENT**  
J. L. Gillson  
**SECRETARY-TREASURER**  
Donald H. Dow  
**EXECUTIVE DIRECTOR**  
Robert C. Stephenson

The American Geological Institute operates as a separate entity under the National Academy of Sciences - National Research Council.

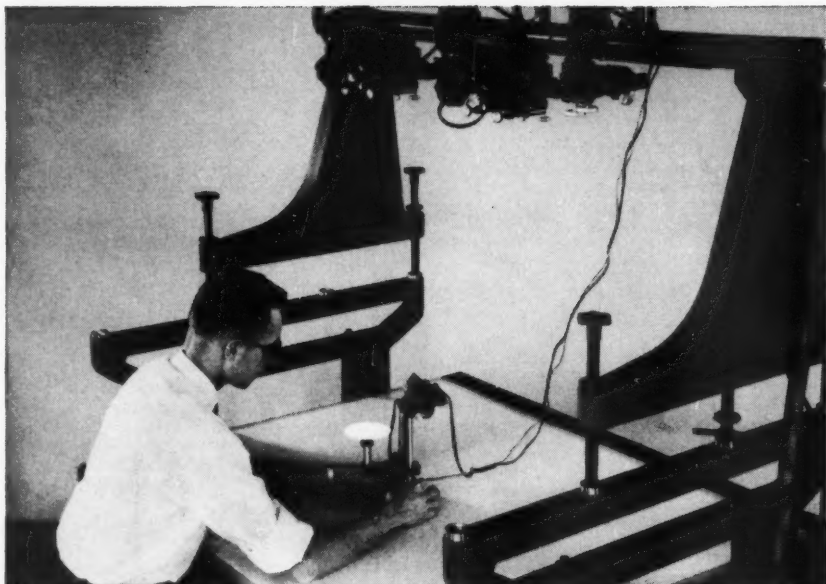
### Member Societies

American Association of Petroleum Geologists  
American Geophysical Union  
American Institute of Mining Metallurgical and  
Petroleum Engineers  
Association of American State Geologists  
Association of Geology Teachers  
Geochemical Society  
Geological Society of America  
Mineralogical Society of America  
Paleontological Society  
Seismological Society of America  
Society of Economic Geologists  
Society of Economic Paleontologists and  
Mineralogists  
Society of Exploration Geophysicists  
Society of Vertebrate Paleontology

GEOTIMES is published eight times a year by the American Geological Institute at Williams and Heintz Lithograph Corporation, Washington, D. C. Address all correspondence to 2101 Constitution Ave., N.W., Washington 25, D. C.

Subscriptions: GEOTIMES is distributed to members of supporting Member Societies as a part of their society membership. Non-member rates—U.S.A. and Possessions, Canada and Mexico, \$2.00 per year; elsewhere, \$2.50 per year. Entered at Washington, D. C., as second-class matter.

The American Geological Institute and its Member Societies assume no responsibilities for statements and opinions advanced by contributors to GEOTIMES.



## Spot oil formations at a glance... plot them faster...with **BALPLEX**

Now you can explore miles in minutes... in revealing 3-D...  
on a table-top. With a Bausch & Lomb Balplex Plotter  
you "translate" aerial photography into vivid stereo models.  
Areas of interest, such as oil dome structures, are readily  
identifiable. If you're exploring for oil or ore, it will  
pay you to find out more about Balplex.

**MAIL COUPON FOR DATA** ►

**Bausch & Lomb**  
**BALPLEX**  
**PLOTTER**

**BAUSCH & LOMB OPTICAL CO.**  
89631 St. Paul Street, Rochester 2, N. Y.

- ☐ Please send me B&L Balplex Catalog F-303.  
☐ Send data on complete B&L photogrammetric line.

Name .....

Title .....

Business Address.....

# Field Siesta

Sandstone Sam is no different than other geoscientists when in the field on warm sunny days. After a lunch of air-dried sandwiches and a thermos of coffee he leans against a rock, pushes his hat over his eyes, basks in the sun, and dozes. His thoughts drift off into space . . .

. . . SPACE—I wonder why geologists are not in on the ground floor of the space exploration program being contemplated by our country? Is it that we can't get off the ground? . . . z z z z . . .

. . . Wouldn't it be geo-wonderful if we matched every buck spent in getting a satellite into orbit with a buck for basic research on the geology of the earth . . . z z . . . Maybe the Moho wouldn't be such a mystery and oil so expensive to find . . . z z z z . . .

. . . Why don't geologists get interested in a National Mineral Policy?

. . . If the licensing issue is so all-fired important to geologists, why does AGI have so much difficulty staffing a committee to study it? ? ? z z z . . .

. . . Amazing—the dexterity displayed in organizing, conducting and publicizing the IGY without reference to geology (the science of the earth) and without participation of geologists . . .

. . . What is the professional growth potential of the geoscientists??? . . . z z z z

. . . Yawn . . . Is Susan B. Anticline truly the world's foremost lady geologist? What would she look like in a field-style chemise? ? ? ?

. . . It can't really be true that most mines are explored in smoke-filled bar rooms . . . Bzzz . . . Bzzz.

. . . *Inertia* is derived from *inert* which is defined as "destitute of power to move itself." Hmmm—Could apply to our profession . . . Yawn . . . zzzz.

Hey, bud, you'd better get back to pounding rocks instead of your ear.



#### OUR COVER

The recently dedicated visitors' center at Dinosaur National Monument, Utah houses a face of the dinosaur quarry. Photo by courtesy of the National Park Service.

The AMERICAN GEOLOGICAL INSTITUTE is a non-profit professional service organization established and managed by the scientific societies in the fields of geology and geophysics in cooperation with the National Academy of Sciences-National Research Council. It is the instrument of the profession serving and advancing the welfare of the geoscientist in matters relating to education, professional responsibilities and government relations. It is an active member of the Scientific Manpower Commission. It also functions in the stimulation of public education and awareness of the earth sciences, through career literature, the scouting program and other channels of communication.

GEOTIMES is the news magazine of the geological sciences. It reports on current events in the earth sciences, public education and public relations efforts throughout the profession, as well as appropriate legislative and governmental issues. It announces scholarships, fellowships, publications and new developments. It provides a forum for discussion of timely professional problems, and affords a common bond between the many specialized groups within the earth sciences.

## *The Future of the Exploration Geologist—*

# CAN HE MEET THE CHALLENGE?

by RAYMOND D. SLOAN<sup>1</sup>

A friend of mine, knowing of my interest in personnel development and the humanities, recently sent me a brief scientific report on a form of insect life known as the processionary caterpillar. As scientists you should be able to appreciate and possibly make use of this bit of dry humor. I quote from the report as follows:

"Processionary caterpillars feed upon pine needles. They move through the trees in a long procession, one leading and the others following—each with his eyes half closed and his head snugly fitted against the rear extremity of his predecessor.

"Jean-Henri Fabre, the great French naturalist, after patiently experimenting with a group of the caterpillars, finally enticed them to the rim of a large flower pot where he succeeded in getting the first one connected up with the last one, thus forming a complete circle, which started moving around in a procession which had neither beginning nor end.

"The naturalist expected that after a while they would catch on to the joke, get tired of their useless march and start off in some new direction. But not so.

"Through sheer force of habit, the living, creeping circle kept moving around the rim of the pot—around and around, keeping the same relentless pace for seven days and seven nights—and would doubtless have continued longer had it not been for sheer exhaustion and ultimate starvation.

"Incidentally, an ample supply of food was close at hand and plainly visible, but it was outside the range of the circle so they continued along the beaten path.

"They were following instinct—habit—custom—tradition—precedent—past experience—'standard practice'—'it's our policy'—or whatever you may choose to call it, but they were following blindly.

"They mistook activity for accomplishment. They meant well—but they got no place."

### PRESENT AND FUTURE DEMAND

In January of this year a representative of the Chase Manhattan Bank of New York talked to you gentlemen about the "Future Growth of the World Petroleum Industry." To refresh your memory, the bank's report showed that the petroleum industry has been characterized by a continuous, dynamic growth. Since the end

of World War I, demand for petroleum products has increased at an average rate of six percent a year. This demand trend has persisted despite a world war, a major depression and several minor economic recessions. The bank concluded that the combined demand for oil and natural gas would increase over the next decade at an average rate of 4.9 percent a year.

During 1957 crude oil production in the United States averaged approximately 7.5 million barrels per day. Consumption averaged roughly 9 million barrels per day and accounted for some 57 percent of the total free world production. The difference between the amount of oil produced and the demand was accounted for by imports and natural gas liquids.

It is estimated that during the next ten years the United States' demand will increase to some 13 or 14 million barrels per day.

With 30 million barrels of proved crude oil reserves, the United States possesses only 10-15 percent of the total reserves of the free world.

Based upon the demand outlook, the United States will consume approximately 38 billion barrels in the next ten years. To support 38 billion barrels of production we would have to discover approximately 57 billion barrels of reserves.

### OIL IS GETTING HARDER TO FIND

Oil is getting harder to find. The high risks inherent in the research for oil are unusual in the business world.

<sup>1</sup>Raymond D. Sloan, Western Division Manager, The Carter Oil Company, presented this talk before Rocky Mountain Association of Geologists, March 21, 1958.

Statistics show that only one wildcat well in nine discovers oil or gas; only one in 44 proves to be a profitable venture; only one in 427 discovers a field of 25 million barrels; and only one in 991 finds a real payoff—a major pool with 50 million or more barrels.

To visualize the significance of these statistics as they apply to the Rocky Mountain area, my own company may be used as an example. During the past eleven years The Carter Oil Company has drilled 68 wildcat tests in the State of Utah. Our total investment in Utah in acreage acquisition, lease rentals, geological and geophysical exploration, and well costs amounts to many millions of dollars.

While seven of the wildcats drilled were considered successful oil producers, only one—our Navajo 114-1 at McElmo Creek in the Paradox Basin—can be considered of major importance. Our total crude oil production to date from Utah pools has netted us a little under \$2,300,000. Our current unrecovered investment in Utah is very substantial. For ultimate success we must recover our investment, a reasonable profit, and have the financial strength to continue an aggressive exploration program.

#### OUTLOOK FOR DISCOVERIES

Exploratory drilling dropped nine percent last year to 14,707 tests and, continuing a decline which has been active since 1949, the new crude oil reserves found per foot drilled hit a new low of 10.7 barrels.

Year	Total Exploratory Drilling	Crude Oil Reserves End of Year (M Bbbls.)
1938	2,638	17,348,146
1943	4,008	20,064,152
1948	8,013	23,280,444
1953	13,313	28,944,828
1956	16,173	30,435,649
1957	14,707	30,300,405

With a decline in both exploratory drilling and crude oil reserves, it might be concluded that there was a decrease in over-all effort during 1957. This, however, was not necessarily the case. Many leading companies expanded their total budget expenditures. As an example, Jersey Standard invested \$1,376,965,000, the largest sum in the company's history, for property, plant and equipment, and in the search for oil and gas. This sum compares with \$1,083,000,000 spent for these purposes in 1956.

(Continued on page 22)

## Committee of One Hundred

The very important Committee of One Hundred for AGI continues to push toward the goal of 100 members. Since the list was reported in the June issue of *Geo-Times*, four new members have been added, bringing the total to 71. The new members are:

H. M. Horton      H. H. Nowlan  
P. L. Lyons      J. B. Umpleby

The role of the Committee of One Hundred is extremely important in the development of the AGI, for the support from the Committee is a strong factor contributing to a stabilized financial environment.

Members of the Committee of One Hundred for AGI pledge to support the Institute through a contribution of at least \$100 per year for five years. Some members have preferred to complete their obligation in a single payment, while others have contributed investment securities rather than cash. The various alternatives offer different tax advantages to the donors.

You may pledge membership in the Committee of One Hundred for AGI or obtain additional information by writing the American Geological Institute, 2101 Constitution Avenue, N. W., Washington 25, D. C.

## INDUSTRIAL ASSOCIATES

Two new Industrial Associates have recently pledged support to the American Geological Institute. These are:

*The Alcoa Foundation*  
*Paul Weir Company, Inc.*

The funds provided by the 28 companies which are Industrial Associates of the AGI are contributed principally in support of AGI's program of public education and career guidance.

### XXIst INTERNATIONAL GEOLOGICAL CONGRESS

Nordic Countries  
August 1960

You may obtain the First Circular for the 21st IGC and be placed on the mailing list for travel literature and plans by writing **CONGRESS TRAVEL**, c/o American Geological Institute, 2101 Constitution Ave., N.W., Washington 25, D. C.

## Better Geologists for Industry?

# We Must Face the Facts!

by B. W. BEEBE<sup>1</sup>

A loud and resounding huzzah to Dr. John C. Maxwell for his most timely and thought provoking article in the May, 1958, issue of *GEO TIMES*. Although I agree in general, I must disagree somewhat in detail, and as to certain of his conclusions. On his major thesis, I am in thorough agreement, insofar as he goes. My purpose in attempting to write a sequel is to travel the rest of the road. There is no doubt that industry, in its frantic desire for more geologists, and its unrealistic recruiting programs, has prevented an undeterminable percentage of men from securing really adequate training.

Before facing the major issue, let us first examine some of the details of Dr. Maxwell's article. Certainly there is a considerably smaller percentage of Ph.D.s among practicing geologists than among the physicists and the chemists. This is not too unusual when we realize that petroleum geology, as an applied science, is less than fifty years old. As a matter of fact, geology, when compared to the basic disciplines, is a very young science. Furthermore, geology is a derivative science, and our plight is probably no different than that of meteorology, agronomy, forestry, or similar applied derivative sciences. This is no reason for self satisfaction and complacency, but is a reasonable explanation. Now that we are of age, we cannot wait for an improvement by this virtue, but should seek and encourage that improvement.

However, we must not lose sight of the very important fact that a degree or degrees, *per se*, contain no magic. They are a certificate of exposure and a license to seek further. Practical application of geology requires a broad background of knowledge, but also requires judgment, which is a rare combination of knowledge, intelligence, and experience. The latter can only be gained on the field of battle. A Ph.D. is no insurance of success. It only furnishes the first of these three components. Sometimes too much knowledge may give a false feeling of achievement. An individual may go through life with a Ph.D. "patting him on the back." This statement should not be construed to mean that I do not favor the training, but some of the allergy that may have developed in industry to the hiring of Ph.D.s stems from unfortunate experience with men in this category.

I doubt that the industry prefers to hire men without Ph.D. training. As a matter of fact, most of the larger companies have for some years strongly preferred men with graduate training. The basic problem, at least since the war, has been that

the demand in a rapidly growing dynamic industry has exceeded the supply. There is no problem with men with Ph.D. training in more progressive companies. Whatever problem exists, lies in the Ph.D.s themselves.

I must also take issue with Dr. Maxwell in his divisions of petroleum geology. While there was a time when petroleum geology was divided into surface and subsurface branches, the tendency in recent years has been to make divisions functionally in many companies. These divisions are logically exploration, exploitation, and administration. In many companies, the district is no longer the basic exploration unit. The district is primarily charged with duties relating to exploitation and administration. Real exploration effort is handled by task forces or special projects groups. These have come into existence since World War II, and are a real step forward in the industry. The next step, of course, is to be certain that the standing and economic reward are equalized, and this change is currently taking place. Selected groups of highly trained individuals who are more interested in geology than in administrative work are being activated with pay scales well equalized with their administrative counterparts. The

(Continued on page 20)

(1) Dr. B. W. Beebe, Vice President, Keating Drilling Co., Oklahoma City, is past vice president of the AAPG and has served as Chairman of the AAPG Distinguished Lecture Program.



# COUNT DOWN FOR THE MOON

Special to GeoTimes

by R. SPACE HEATER

Cape Carnival

Without fanfare, in a well-kept secret night assembly, (*only one reporter cleared for attendance*) the United States made its 1958 bid for leadership in the applied sciences by placing a manned vehicle in space: Destination—the Moon.

According to Admiral John Seaspeed of the General Staff, the project is devoted to obtaining research data for the next great advance in space-travel technology. The special crew, members of the PICK AND HAMMER CLUB, fun-making group of the U. S. Geological Survey, is trained in astronomical navigation, combustion engineering, collisional deactivation, ionospac television, photogrammetry and geophysics.

An F-14 aerial camera with stereoscopic telephoto lenses is biswiveled aboard to bring back sufficient photography for the Survey to carry out its newly assigned mission of "mapping the moon topographically and geologically." This includes the dark side, which has never been seen before.

Public announcement of this first manned space flight, powered by a combination 5-phase Jupiter-Thor-Hercules-Vanguard-Hermes jet engine, was prepared for detailed analysis in Volume HI (for May) of the Astrophysical Jernal, a University of Chicanery publication.

The Journal says that prior to countdown time here at the Cape, rivalry for leadership of the expedition was keen between the Geological Survey Air Corps and "members of the Bureau's branches for geochemical, paleostrutagraphical, geofizzleal and hydrostrutrical activities." Veteran geocosmical expert, Lou Purrier of the Survey's Boston office (also Washington WAE) served as Master of Ceremonies for space tryouts held May 2 in the auditorium of Washington and Lee High School, Arlington, Va.

As producer of the Geological Survey's time-honored annual Pick and Hammer Club Show, Dr. Purrier had this to say about the performance of his "Missileaneous Players," cast in the 1958 rendition of *Lunar Ticks, or How to Solve the Space Problem*.

"It was a sub-colossal epic! The Moon offers the best opportunity yet for the Survey to find an unclaimed spot on which to

**OIL GEOLOGISTS NOTE:** A special AAPG production of the *Pick and Hammer Show* will be staged in Washington following the Atlantic City AAPG Meeting, April 1960.



Doin' the TRILOBITE TROT . . .

"First you squeeze your flippers close up tight  
Flip 'em to the left and flap 'em to the right.  
Take a teeny hop and like as not  
You'll be doin' the Trilobite Trot!"

Photo by Marjorie Hooker

erect its new building."

Those assigned to overcrowded Survey offices have been looking for *Lebensraum* for years. A bit of research by your reporter disclosed that the 1904 Pick and Hammer show, staged on the eve of the Survey's 25th Anniversary, likewise held high hope for a suitable new headquarters building site. Then as now, the Pick and Hammerites roasted government officials and fellow natural scientists alike in their annual release of pent-up steam. It is always a lambasting performance, in keeping with the Latin phrase they have adopted as their motto, *Soc et Tuum*.

They sang to the tune of the Wizard of Oz, "*We're all behind our Admiral, Splendiferous Admiral Speed. We'll swear he is the brassiest brass, if ever some brass we need.*" Then they went after everybody who wastes water as though there were no end to the world's supply: (to the tune of "*When You are Old and Gray*").

"*Since the world depends on water,  
Exploit it while ye may.  
You know we really ought 'ter  
Before it drains away.*"

Survey moon-bound hydrologists apparently recognize that dirty water on earth may be just as bad as finding no water at all on the moon!

They sang a Harvard version of the "*Huff N' Spoof Song*"; panned hard-rock geologists for "*Taking Too Much for Granite*"; viewed with alarm, current "*Science of the Times*"; and danced the "*Fun Demential*" to the tune of the Pennsylvania Polka:

"*Strike up the Music, the job has begun—  
The Lunar Mapping Program.  
Pick out your gimmicks and join in the fun—  
The Lunar Mapping Program.*"

Fossil hunting on the Moon promises to be something out of this world. One of

(Continued on next page)



The face of the dinosaur quarry is exposed in the north wall of the visitors' center. It is interesting to note that the building is oriented parallel to the strike and that through the glass wall the visitor may observe the relationship of the quarry to the steeply-dipping beds along the strike.

**TO THE MOON** *Continued from page 9*  
the tricky devices squeezed aboard was a "handy-dandy automatic collector—for fossil-pickin' experts." It seemed to work on the vacuum cleaner principle. In fact, that's what it looked like.

They had an electric generator-collector for producing power, that looked exactly like the sort of kite Ben Franklin singed his knuckles on; and a "handy-dandy mineralogist pack, complete with dehydrated mineralogist (a schmoos-shaped balloon)." When someone protested, asking what good a deflated, or dehydrated mineralogist was, a character (obviously no Ph.D.) exclaimed, "Think a bit, gentlemen! A mineralogist who can be stored away when not in use!"

One skit was a take-off on early days of Survey mapping when the length of a traverse was determined by counting the number of revolutions of a buggy wheel with a handkerchief attached to one spoke. Hopping around on stage as the curtain went up were the lunar map-makers, practicing pogo-stick cartography!

Yes, they panned the Director of the Survey too!

It seems the Bureau's new Datatron calculator was used to compute the required rocket-fuel charge and the path the space-vehicle would follow enroute to the moon. But instead, someone set the computer dials for earth orbiting, and then fed in the wrong set of data. Before the rocket zoomed off (in a cloud of liquid nitrogen) it developed there was plenty of room and fuel aboard to take along "Director Noolan and his staff."

"Do you mean to tell me," says one character watching the blast-off, "That the director and all his staff are going to go round and round and round up there and will never get anywhere?"

"Of course," was the reply, "but that won't be anything strange to an experienced Gov'tment geologist."

## DINOSAURS

meet the people

New Mission 66  
Project Dedicated

A new and truly unique museum was officially dedicated at Dinosaur National Monument June 1 when Assistant Secretary Roger Ernst, U.S. Department of Interior, and Governor George D. Clyde of Utah cut the ribbon and opened the building.

Dinosaurs have long been considered a top attention-getter by museum men everywhere, but the exhibit here is quite different from that of the typical natural history museum. The main exhibit at Dinosaur is the quarry face and the bones of dinosaurs that it contains. This museum, the Quarry Visitor Center, is the only place in the world where visitors can see bones in the rock and watch paleontologists at work.

This method of exhibition is made possible by the quantity of bones found here, and the attitude of the strata which contain them. The bones are found in the upper layers of the Jurassic Morrison formation located on the flank of a small anticline with the beds dipping about 70 degrees to the south. The steep dip exposes the bones on a wall rather than a floor as would be the case if the beds were horizontal.

The National Park Service took advantage of this fact and used the quarry face for the north wall of the museum building. The architects designed the museum to minimize the break in continuity between the geological features outside the building and the quarry face within. The effect they achieved is startling.

The contemporary design of the building is admirably suited to its location. Its glass walls permit an unobstructed view of the surrounding scenery and the quarry layers can be traced along strike in both directions. Even the roof silhouette repeats the profile of the nearby topographic saddles caused by erosion of alternating hard and soft rocks, and the conventional exhibits are designed to supplement the quarry face. What are dinosaurs? When and where did they live? Why are so many found here? These are only a few of the questions asked by visitors. Most answers are provided by the many exhibits which also explain how the bones were

preserved and uncovered by erosion.

To many visitors, geologists and laymen alike, the highlight of a visit to Dinosaur National Monument is watching Dr. Theodore E. White and his skilled preparators work in the 180 foot quarry face. It is exciting to watch the jackhammers drill the barren rock, to see the men chip away the sandstone leaving the bones standing in high relief.

Eventually the quarry face will present to the visitor a montage of dinosaur bones that faithfully records the vagaries of stream action which deposited and buried them millions of years ago. The skeletons and isolated bones will be identified to help the visitor realize what a diversity of dinosaurs make up the quarry fauna.

Because visitors are so interested in the work of developing the quarry face, the National Park Service is in no rush to complete this phase of the work. The Service wants to keep this a working exhibit, not a static one.

The idea of using the quarry as an in-place exhibit was not original with the National Park Service. Earl Douglass, discoverer of the fossil deposit, realized its scientific importance in 1915. He believed the quarry should be developed as you can see it today. Dr. Barnum Brown of the American Museum of Natural History lent his influence to an in-place exhibit. However, it was not until the Park Service's Mission 66 program was launched that funds became available for construction of a museum.

What is the significance of this museum? To answer this question it must be considered in conjunction with other museums of natural history. There is little doubt that a person who sees this unique Quarry Visitor Center will later get far more out of subsequent visits to the dinosaur halls of other museums, for he will have a better understanding of how fossils are found and of the labor and skill necessary to excavate them.

No one can look at the fossil bones in the quarry without a sense of wonder. The tilted rocks, the sheer size of the bones and other features of the striking surroundings set the visitor thinking geologically, and he becomes interested in the geological interpretation offered by the other exhibits. When he leaves the museum he carries away a better understanding of dinosaurs and their world. But he also has learned something of the science that reconstructed the ancient landscape and traced its evolution into the scene of today. He has learned some geology and he probably liked it.

## GEOLOGY

in  the  
Public Eye by  
Robert L. Bates

Pictures of minerals and fossils are featured on a series of 1958 Swiss stamps known as Pro Patria semipostals. Four were pictured in a recent issue of the *Western Stamp Collector*, sent in by Dr. Arthur Bevan. The 10+10 centimes stamp shows a cluster of fluorite crystals; others show garnet crystals, quartz crystals, and a coiled ammonite. All are in color. Even the newsprint reproductions reveal that certain distinction, that "class," so characteristic of European stamps and so spectacularly lacking in our own. Future Pro Patria semipostals will help "to familiarize the world with the minerals and rock formations of the country."

Only one error was noted in the stamp story "Ammonite, a particularly rare type of garnet." (Almandite? Andradite?) *Western Stamp Collector* of Albany, Ore., meet *The Mineralogist* of Portland. (75 miles.)

Several people have been writing protest letters recently. T. S. Knapp of Mt. Pleasant, Mich., writes in *The Mineralogist* that TV spectacles like "Our Mr. Sun" insult the intelligence of even the 12-year-old that Hollywood always seems to aim at. Nature and science, he maintains, are fascinating in their own right and don't have to be hammed up by Mickey Mouse and whimsical adult actors talking down to their audience . . . C. J. Wells and three other engineering geologists of the U. S. Army District at Little Rock wrote to their fellow geologists in the Corps of Engineers, suggesting a campaign to obtain for engineering geologists the same Civil Service pay raises recently awarded engineers. Apparently it helped . . . Jim Schopf of the USGS Coal Geology Laboratory in Columbus writes to the New York Life Insurance Co. protesting the slant of their public-service advertisement, "Should Your Child be a Scientist," by Edward Teller. Schopf points out that Teller equates science with physics and chemistry, and essentially omits botany, zoology, and geology. This is getting to be and old story these days, and it ought to be protested loudly at every chance . . . There is nothing like a good hearty gripe to make enjoyable reading. Anybody want to volunteer?

# GEOLOGY DOWN UNDER

## EARTH SCIENCES AT THE ANTIPODES

By B. W. COLLINS<sup>1</sup>

For such a young country (first organized settlement and first proclamation of British sovereignty in 1840), New Zealand has a long record of geological research. Its national Geological Survey is one of the oldest in the world, having been established in 1864 under Dr. (later Sir) James Hector, the protege of Sir Roderick Impey Murchison, then director of the Geological Survey of Great Britain. Hector had only a few years previously discovered Kicking Horse Pass in the Canadian Rockies while acting as surgeon and geologist to the Palliser expedition. The pass is now used by the Canadian Pacific Railway for their trunk line from Montreal to Vancouver.

But earlier still some famous names had contributed to New Zealand geology. From Captain James Cook (1769) onwards, early navigators and explorers called at these islands in the South Pacific. There was the Frenchman Dumont D'Urville (1827), the Englishman Sir James Clark Ross on his historic voyage in the "Erebus" and "Terror" (1839-43), and the American Charles Wilkes of the United States Exploring Expedition (1839-42). Some of these made brief references to the rocks and minerals of the country in the accounts of their voyages. The first really significant contribution was that of R. McCormick, surgeon with Ross, who published seven pages on the "Geology of New Zealand" as an appendix to Ross's Voyage of Discovery and Research . . . (1847). J. D. Dana, geologist with Wilkes, made further outstanding contributions in volume 10 (Geology) of the scientific publications of the U.S. Exploring Expedition (1849). Earlier the country had been visited by Charles Darwin, during the voyage of the "Beagle" in (1835), but he made only very brief reference to its geology and his few remarks on New Zealand were largely unfavorable.

The earthquakes of 1848 and 1855 brought New Zealand into the world news, and lengthy references to them and their geological effects were incorporated in the later editions of Sir Charles Lyell's classic works.

Other notable early New Zealand geologists were Sir Julius von Haast, a migrant from Germany (who first gave geology the term "alluvial fan" for low-angle alluvial cones in his descriptions of the Canterbury piedmont alluvial plains in the sixties), and

Dr. Ferdinand von Hochstetter, geologist on the Austrian frigate "Novara", best known for his early description of the Auckland volcanoes and the active volcanic and thermal regions of the central North Island (1864).

### VISITORS HAVE MADE MARK

Truly New Zealand's geology began well, with a galaxy of famous names and a real international flavor. And since those days we have had visits from many famous overseas geologists, many of whom have left their mark. North American names that come to mind include W. M. Davis, Douglas Johnson, and H. T. Stearns of the United States; James Mackintosh Bell from Canada, who reorganized the Geological Survey in 1905 and remained as Director until 1911; and more recently Preston E. Cloud, Donald E. White, R. H. Finch, and Wallace W. Attwood, who attended the 7th Pacific Science Congress in 1949. And then of course there is the host of oil geologists who have come to this country at various times since the late twenties to try to assist in wresting from the earth its store of liquid gold—unfortunately with little success so far. Americans in the field of petroleum geology, whose work in New Zealand is well known, includes F. G. Clapp, E. Jablonski, Max Steinecke, Chester W. Washburne, L. B. Kellum, George Barnwell, Alan Weymouth and Harold Thoms—but there were many more. Recent geological visitors from the U.S. are Professors J. J. Graham (Stanford) and Richard P. Goldthwait (Ohio State).

In the reverse direction, quite a number of New Zealand geologists have visited the United States, some remaining there permanently. A recent Fulbright visitor was Maxwell Gage, who lectured for a year at the University of Illinois, Urbana. Others who have taken up permanent posts are

<sup>1</sup>B. W. COLLINS until July 1957, District Geologist, N.Z.G.S., Christchurch, New Zealand. Present address: Scientific Liaison Officer, N.Z. Scientific Office, Africa House, Kingsway, London, W.C. 2, England.

F. J. Turner of the University of California at Berkeley, C. O. Hutton at Stanford, and Brian Mason who is now in charge of the mineralogy department at the American Museum of Natural History, New York.

Other New Zealand geologists of some note, whose names may be familiar to some readers, are James Park, author of several textbooks and Professor of Mining (died in 1946); Patrick Marshall, best known for his work in petrology and author of the term "ignimtrite" for welded tuffs (died 1950); W. N. Benson, F.R.S. (1885-1957), who in a long career as Professor of Geology at Otago University, Dunedin, published papers on many topics but may be best known outside this country for his memoir on "Tectonic Conditions Accompanying the Intrusion of Basic and Ultrabasic Igneous Rocks," published by the U.S. National Academy of Sciences in 1927; and Charles A. Cotton, the doyen of New Zealand geologists, who as a devout follower of W. M. Davis, became widely known as a geomorphologist through his papers and textbooks, many of which have been published overseas. Cotton's trilogy—"Landscape," "Climatic Accidents," and "Volcanoes as Landscape Forms"—have probably done more to publicize New Zealand and geology abroad than the work of any other writer.

#### GEOLOGICAL SOCIETY FORMED

Partly because of lack of numbers, however, New Zealand geologists remained unorganized as a group until quite recently. A further reason was the fact that local geologists had always taken an active part in the leading learned society in the country, the Royal Society of New Zealand (formerly the New Zealand Institute), and its local branches. It was indeed the geologists Hector and Haast who played key roles in the foundation of this body in the sixties of last century. In 1954, however, the time seemed ripe for the formation of an association of geologists, and at a meeting in Auckland at the time of the Eighth New Zealand Science Congress this suggestion received enthusiastic support. In the last two decades several other groups of specialists had formed separate societies, and the geologists were in danger of becoming the last unorganized group. The writer convened this meeting at the suggestion of Dr. H. W. Wellman, Chairman of the Geology Section of the Congress, and was also appointed convener of the interim organizing committee that was then set up.

The inaugural meeting of the Geological Society of New Zealand was held on May

14, 1955, in Kaikoura, a small coastal village in the South Island which happened to be the venue of the 1955 N.Z. Geological Survey staff conference. University and museum geologists had also been invited to attend this conference, and so were represented at this meeting. A simple constitution was adopted and a permanent organization set up. The first President was Mr. R. W. Willett, the present Director of the N.Z. Geological Survey, and the writer became Secretary.

The objects of the Society are to serve as a means of facilitating communication among members; to foster investigations in the earth sciences; to serve as a channel for the expression of the views of New Zealand geologists; to organize conferences, and to assist in the organization of the Geology Section of the N.Z. Science Congresses held under the auspices of the Royal Society about every three years. Full cooperation has been received from the Director of the Geological Survey, who has agreed to make the survey staff conferences (generally held annually) open to outside geologists. Annual meetings of the Society have therefore been held since its formation either in conjunction with these conferences or, at the same time as other general science congresses such as those of the Royal Society or the Australian and New Zealand Association for the Advancement of Science.

Membership of the new society has grown rapidly, as shown by the following figures:

May 1955 .....	31
December 1955 .....	96
May 1956 .....	124
December 1956 .....	147
August 1957 .....	185

Membership is open to all interested in the earth sciences, and the annual subscription at the present time is the purely nominal sum of 2s.6d. New Zealand geologists overseas are especially invited to join, and overseas geologists with an interest in New Zealand are also welcome. The Society distributes a newsletter at irregular intervals (four have appeared so far) with contributions from members, lists of members with their interests and addresses, reports of meetings, personal notes, official announcements, and so on. Many of the members have interests in marginal fields, such as soil science, palynology, mining, and geophysics. Only about a third are professional geologists in the narrow sense.

(Continued on next page)



#### FRONTIERS OF N.Z. GEOLOGY

Present growing points of geology in New Zealand include:

Pleistocene research, especially C14 dating, and palynology

A resurgence of interest in petroleum exploration, with two major overseas companies active

Geology of New Zealand's Antarctic Territory, the Ross Dependency

A new four-inch-to-the-mile mapping program of the Geological Survey

Encouraging results of the search for radioactive ores

Recent fault movements, especially transcurent (lateral) movements in the Pleistocene

Movements and effects of existing glaciers

Volcanology and research into the utilization of geothermal steam for electric power production

Many of these points have been (and will be) covered by notes in the Newsletter.

It may be of interest to mention that the Geological Survey hopes to complete and publish a new series of 4-mile geological maps of the whole country by 1964, when it will celebrate its centenary, and when, it is hoped, New Zealand will be the scene of the 22nd International Geological Congress. An invitation to hold the 1964 Congress in New Zealand was issued at the Mexican Congress in 1956 and has government support. New Zealanders confidently hope to be able to welcome many North American friends and co-workers to their country in a few years time and assist them to see something of the varied geology of their islands.

The Geological Society of New Zealand has made no plans for the publication of a journal, as it is felt that existing facilities for publication are adequate. Most geological work is published in the *Transactions of the Royal Society of New Zealand*, the *New Zealand Journal of Science and Technology* (to be succeeded in 1958 by three new journals of which one will be the *N.Z. Journal of Geology and Geophysics*, published by the Department of Scientific and Industrial Research), and the serial publications (*Bulletins*, etc.) of the Geological Survey.

On the writer's transfer to his present position, Mr. L. E. Oborn has taken over the duties of Secretary and Editor of the Newsletter. His address is c/o N.Z. Geological Survey, P.O. Box 2110, Christchurch, C.I., New Zealand. The current President is Dr. J. T. Kingma, N.Z. Geological Survey, Wellington.

## **MANPOWER** *in a column -*

By HOWARD A. MEYERHOFF

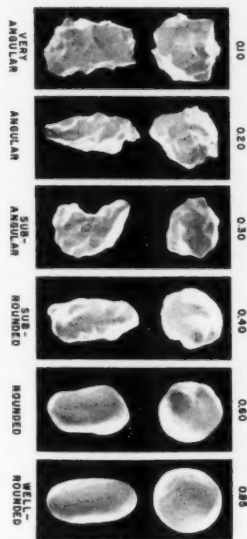
Scientific Manpower Commission  
1507 M Street, N.W., Washington 5, D. C.

The letter published in the March issue of *GEO TIMES* from Pfc. Robert E. Long has touched off a series of explosive events from Tokyo to Washington. In the military, reactions have ranged from mortification at top levels to undisguised fury in the lower echelons, where responsibility for the situation Pvt. Long described resides. No one, however, has denied the simple fact that these five men were left without work or supervision, and even when they had work, no one ever inspected the maps they made.

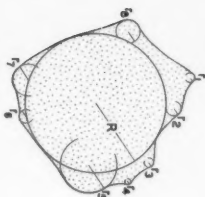
Not all service in the Scientific and Professional Personnel Program is as fruitless as that which seems to have characterized the U.S. Army Map Service, Far East. The S&PP Program was instituted in 1948 in a serious effort to assign scientists and engineers to military installations where use could be made of their specialized training. It was recognized that military requirements differ from civilian requirements for professional personnel, and that some men could not be properly or appropriately assigned. Even so, the utilization of many of the 5,500 men who currently qualify for the S&PP Program leaves much to be desired.

In actual operation, the program ranges from bad to very good. The reasons for its shortcomings are easier to recognize than to correct. So far as we can discover, it has not been revised in the ten years of its existence. But the principal cause of discontent is bad management, and the complaints that have reached SMC have come almost invariably from those installations suffering from poor direction or from a clash between a spit-and-polish type of military commander and the civilian director of research. Where the direction is good, on the other hand, the program is enthusiastically received. The two S&PP operations at Huntsville, Alabama, for example, prove that the program can be good and that an immediate objective should be to bring the poorly directed installations up to the level of the best. This will be possible only if the Defense Department scraps its obsolete personnel along with its obsolete equipment. There are still too many commissioned officers who don't know it takes brains to fight a technological war.





Upper row: particles of high sphericity; lower row: particles of low sphericity



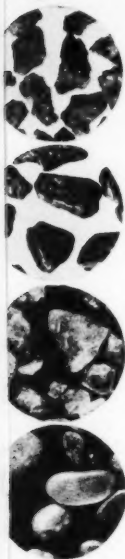
**Definition of Roundness.**  
From Krumbein, G.K. Bull. v. 51, p. 670, 1960.  
Roundness,  $R$ , defined as the average radius of the corners divided by the radius of the maximum inscribed circle:  
$$R = \frac{r_1 + r_2 + r_3 + \dots + r_n}{n}$$

**Experimental rounding of sand in 2000 miles**

Abrasion mill studies by G.A. Thiel, Jour Sed Petrology, v. 10, pp. 103-107, 1946.  
Rounded over the inside of a steel drum at a velocity of 1.8 m./hr.; total travel approximately 2000 miles.

Crushed quartz  
1/2 - 2 mm

Quartz grains  
after abrasion



## AGI DATA SHEET 7

AGI Data Sheet 7, *Roundness of Sedimentary Particles* (comparison chart for visual estimation of roundness) and the *Wentworth Grade Scale* is the fourth data sheet to be prepared under the guidance of the AGI Data Sheet Committee listed below:

John E. Allen, Portland State College  
William Beatty, Stanford Research Institute  
Chester Longwell, U.S.G.S., Menlo Park  
Vincent McKelvey, U.S.G.S., Menlo Park  
George Thompson, Stanford University  
Richard M. Foose, Chairman, Stanford Research Institute, Menlo Park.

Persons wishing to submit materials for consideration in the data sheet series should write to Dr. Foose.

## KILAUEA FILM

The U.S. Geological Survey recently released a 16 mm. color, sound movie on the 1955 *Eruption of Kilauea Volcano, Hawaiian Islands*. The movie was prepared from documentary films recorded by volcanologist Gordon A. MacDonald who in 1955 was Director of the Hawaiian Volcano Observatory of the U. S. Geological Survey. The films are considered the best film record of the birth and development of a pit crater.

The film runs 11 minutes. It may be requested for interested group showings by addressing, U.S. Geological Survey, Washington; Denver Federal Center; or 4 Homewood Place, Menlo Park, California.

## ILLINOIS ISSUES POLICY REPORT

*Stratigraphic Policy of Illinois State Geological Survey* is the title of a new report which sets forth the current concepts on stratigraphic classification of the Survey in the light of recommendations of the American Commission on Stratigraphic Nomenclature. Authors Willman, Swann and Frye discuss the newly adopted multiple classification which includes rock-stratigraphic, time-stratigraphic, biostratigraphic, cyclical, facies and soil-stratigraphic classifications.

The concept of multiple stratigraphic classification has its basis in the fact that stratified rocks have many types of properties which may be used as bases for differentiation. According to the type of characteristic selected, the same rocks may be classified in several schemes. Categories may recognize divisions derived from the physical character of the rock layers, zones defined by their fossil content, divisions based on time of origin, and other discriminating features.

The authors hope that this statement of policy will not only provide uniformity in stratigraphic classification and nomenclature in Survey publications, but will also increase the flexibility of the classification, and will direct attention to fundamental problems in this field.

The report, designated as Circular 249, may be obtained upon request by sending two cents to cover postage to the Illinois State Geological Survey, Urbana.

Grain Limit (mm)	(microns)	Grain Name	Yield (mesh)	0 Units (in mesh)
100µ	160	---	---	-12
200µ	80	Very large boulders	---	-11
1020	40	Large boulders	---	-10
512	20	Medium boulders	---	-9
256	10	Small boulders	---	-8
128	5	Large cobbles	---	-7
64	2.5	Small cobbles	---	-6
32	1.3	Very coarse pebbles	---	-5
16	0.6	Coarse pebbles	---	-4
8	0.3	Medium pebbles	---	-3
4	0.16	Fine pebbles	5	-2
2	0.08	Very fine pebbles	---	-1
1	0.04	Very coarse sand	16	0
1/2	500	Coarse sand	31	+1
1/4	250	Medium sand	62	+2
1/8	125	Fine sand	115	+3
1/16	62	Very fine sand	250	+4
1/32	31	Coarse silt	---	+5
1/64	16	Medium silt	+6	+6
1/128	8	Fine silt	---	+7
1/256	4	Very fine silt	---	+8
1/512	2	Coarse clay size	---	+9
1/1024	1	Medium clay size	---	+10
1/2048	0.5	Fine clay size	---	+11
1/4096	0.25	Very fine clay size	---	+12

### Interpretation of Roundness

Bulkiness is controlled by the viscosity of the transporting medium, the viscosity of the material being transported with the particles, and the weight, hardness, shape and size (stability) of the particle. Because of the complexity of these factors, the abrasion resistance of a particular material cannot be compared with that of another material on a quantitative and qualitative basis. However, plastic is highly resistant to abrasion, and some limestones are less resistant; other limestones, sandstone, lava, gneiss, schists, and quartzite and quartz porphyry are resistant; gneiss, plastic rocks, dense volcanics, and some limestones are highly resistant to abrasion. The abrasion resistance of materials (in terms of decreasing resistance) is as follows (2,3):

[illegible]

(1) Kuenen, Ph. H., 1956, *Jour. Geol.*, v. 64, p. 366.

**Popular Geology  
in Print**  
by Mark W. Pangborn, Jr.

**BIG OIL MAN FROM ARABIA**, by *Michael Sheldon Cheney* (Ballantine, 1958, \$4.95), despite its corny title is one of the most interesting travel books that this reviewer has read in a long time. Cheney recounts seven years spent as a personnel man with ARAMCO, and his penetrating observations on the impact of 20th century technology on a medieval nomad society leave little room for optimism concerning democracy's future in the Near East.

In MR. FIVE PER CENT (Rinehart, 1958, \$4), *Ralph Hewins* has produced a gossipy, readable life of Calouste Gulbenkian, Turkish-Armenian financier who excelled at intrigue and avoided publicity like poison, and who acquired vast wealth while building up some of the great European oil trusts. *William A. Owens'* authentic historical novel, *FEVER IN THE EARTH* (Putnam, 1958, \$4.50), pictures oil field life at Spindletop and at other Texas strikes in the years following 1901; vivid and earthy but not lurid.

Amateur collectors and lapidaries will welcome the new **ROCKHOUND BUYERS**

GUIDE, which is the April issue of the *Lapidary Journal* (Box 518, Del Mar, Calif., 1958, \$1); in addition to the usual articles and calendar of events, this 232-page issue features a list of collectors' clubs and an extensive list of mineral dealers, indexed by product and by locality.

A superior new rockhound guide is *Richard Maxwell Pearl's COLORADO GEM TRAILS AND MINERAL GUIDE* (Alan Swallow Co., 2679 S. York, Denver 10, Colo., 3d ed., 1958, \$2.95); good collecting areas are briefly described; maps and bibliographies are provided. Other recent guides include *CALIFORNIA GEM TRAILS* by *Darold John Henry* (L. R. Gordon Co., 1810 E. Anaheim St., Long Beach, Calif., 3d ed., 1957, \$2.50), and *MIDWEST GEM TRAILS*, by *June Culp Zeitner* (Mineralogist Publ. Co., 329 S.E. 32nd St., Portland 15, Ore., 1956, \$2).

Boys 11 to 16 will enjoy *Felix Sutton's HOT ROCK OF HONDO* (Young America Books, 1958, \$1.95), an exciting tale of uranium prospecting and claim jumping in the canyon country of northern Arizona.

The latest of several fine books on geophysics and the I.G.Y. is *THE EARTH AND ITS ATMOSPHERE*, edited by *David Robert Bates* (Basic Books, 1958, \$6); suitable for serious high school students and adults, this volume is made up of articles by 15 experts, mainly British, on the earth's origin, crust, and interior, ice ages, geomagnetism, the oceans, and the atmosphere.

## FRENCH COLLOQUIUM

### Considered Advances In Marine Geology And Oceanography

A Report by Roger H. Charlier

Fifteen foreign and some forty French geologists were invited by the Centre National de la Recherche Scientifique of France, to participate in the 83rd International Colloquium. The theme of the gathering was to bring us up-to-date on the advances made in the field of marine geology and oceanography. The meetings were held in Nice, Monaco and Villefranche.

The United States had the largest foreign attendance with Emery and Menard from California, Dietz from London, Heezen and Charlier from the East Coast. Ewing was unable to attend due to an accident. Others were from the United Kingdom, Italy, Spain, The Netherlands, Norway, Sweden, Japan, and Vietnam.

Sessions were held daily from May 5 to 12 and the culminating point was the inauguration of the new Oceanographic Station of the University of Paris in Villefranche. The remarkably well equipped laboratories are installed in the former repair shops of the Sardinian fleet and will welcome any scientist who wishes to do oceanographic research. Jacques Bourcart, of the Sorbonne, is the director.

Communications covered a wide range of sea-connected research. The technical note dealt especially with methods and apparatus of soundings and the use and manability of the bathyscaphe. The French Government released a classified film on deep sea diving in connection with research, rescue work and even strategy, and the participants learned that the Belgians are attempting to build a bathyscaphe which could reach the greatest oceanic depths.

While several speakers highlighted research in the Mediterranean, a good amount of results was disclosed for the Atlantic and the Pacific. Through the efforts of the French a complete map is now available giving the morphology of the continental margin from the Pyrenees to Sardinia. A few gaps still exist near Corsica, but will be filled this summer through the Calypso expedition of May-June. The hypothesis of expansion of oceanic areas gave rise to considerable interest and to speculations as to its application for the Mediterranean. Heezen reported on his work in this domain, while Glangeaud of Paris dis-

(Continued on next page)

Translation now available . . .

АКАДЕМИЯ НАУК СССР

## ГЕОХИМИЯ

Journal of Geochemistry

by the

Academy of Sciences, U.S.S.R.

published by

THE GEOCHEMICAL SOCIETY

with the financial assistance of  
The National Science Foundation

During the first two years of publication  
almost 160 papers were published:

• General; distribution of elements.....	43
• Geochemistry of radioactive elements; age determinations .....	29
• Mineral and crystal chemistry x-ray studies .....	20
• Applications of physical chemistry and thermodynamics .....	19
• Chemical petrology and volcanology .....	12
• Experimental petrology and mineralogy .....	10
• Distribution of stable isotopes.....	9
• Geochemistry of organic materials and sedimentary rocks.....	8
• Chemistry of meteorites.....	8
• Geochemical prospecting .....	6
• Hydrogeochemistry .....	4

No. 1 for 1958 is now being translated and will be published during the summer of 1958

Price, per year (8 issues) \$20.00

To Members of The Geochemical Society  
and educational institutions, \$10.00

Clip and Mail for Subscription

The Geochemical Society  
Prof. E. Wm. Heinrich, Manag. Ed.  
Mineralogical Laboratory  
University of Michigan  
Ann Arbor, Michigan

Enclosed is \$ \_\_\_\_\_ for subscription  
to the translation of the 1958 issues of  
GEOKIMIYA.

Please indicate whether you would be  
interested in issues for previous years.

yes no

☐ ☐ 1956

☐ ☐ 1957 at the same or a  
comparable price.

Name \_\_\_\_\_

Address \_\_\_\_\_

\_\_\_\_\_ please print

cussed in that light the tectonophysical characteristics of the Mediterranean.

Peres of the University of Aix-Marseille discussed the observations made in bathyscaphe plungings by his team Peres-Picard-Blanc: they are of special interest for biologists and biogeographers, but should retain the attention of marine geologists for implications resulting from coral populations. At the Oceanographic Museum of Monaco new techniques of underwater photography, movie making and television were explained. It seems that in the field of television the British are well ahead of the other nations. The afternoon meeting at Monaco was held at the International Hydrographic Bureau. The terms for naming the various accidents of submarine topography were explained and it seems well that complete unanimity and general acceptance are not to be expected too soon. The wish was expressed that a commission be created to continue this task and to propose a list of terms, in English and French, to name the secondary features of submarine relief.

The California precontinental borderland and the distribution of the flat abyssal zones features principally research on our West Coast.

The hope was expressed by the geologists that the security restrictions enforced by the American Government and which deprive all scientists of valuable knowledge acquired by some agencies, might soon be removed, so that research on Oceanic Science may continue unhampered. The amount of information which was communicated at this Colloquium was, nevertheless, so considerable that discussions had to be limited and members emphasized the need for another meeting in the near future.

As the 83rd Colloquium coincided with the bi-centenary of the birth of Marshall Massena, the Municipality of Nice invited the geologists to a reception at the Villa Massena. Another reception was given by the mayor and city council of Villefranche where now "besides Cocteau's chapel" there will also be a study center. A field trip was conducted by Jacques Bourcart about the Cap d'Ail. The region is extremely interesting and of immediate concern because the rocks are sliding rapidly as a result of heavy rains during March and April. All efforts to remedy the situation have failed so far.

The local arrangements committee received unexpected cooperation: the weather had been disastrous; cold, rainy, foggy—and even some snow fell on the Haute Corniche during spring. Phoebus, though,

## GSA ANNUAL MEETING

St. Louis

### Engineering Geology Program Takes Shape

The Division of Engineering Geology of the Geological Society of America has announced its preliminary program plans for the Annual Meeting of the GSA to be held in St. Louis Nov. 6-8.

The general theme of the session will be Rock Mechanics. Papers committed are:

*Effects Elastic Properties of Rocks on Civil Engineering Design*, by Wm. Judd.

*Application of Rock Mechanics to the Design of Pressure Tunnels*, by J. Parmajian.

*Utilization Rock Mechanics in the Design of Underground Power Plants*, by D. Moye (Coming here from the Snowy Mtn. Project in Australia)

*Rock Mechanics on the Niagara Power Plant Project*, (Ontario Hydro) by Ross or Gorman.

*Foundation Studies Mackinac Straits Bridge*, by J. Rosenau.

*Land Subsidence San Joaquin Valley* (Calif.) by J. Poland.

*Foundation Rebound at Virginia Point Damsite* (Merced River, Calif.) by Bruce Hall.

Meeting with the GSA will be Paleontological Society, Geochemical Society, Society of Vertebrate Paleontology, Society of Economic Geologists, and the Association of Geology Teachers.

### JOURNAL OF SEDIMENTARY PETROLOGY INDEX

The Society of Economic Paleontologists and Mineralogists announces that a new *Index to the Journal of Sedimentary Petrology*, vols. 1-26 will be available about September 1, 1958. Prepared by Barbara H. Bloom under Jack L. Hough, Editor, the index (SEPM Spec. Publication 6) may be ordered from SEPM, Box 979, Tulsa 1, Okla. The price to members of SEPM is \$1.25, to others \$1.50.

changed its mind and shone throughout the Colloquium giving the ladies and families of the Earth and Sea Scientists a smiling Riviera. Female pulchritude and anatomy displays were furnished by the Folies Bergere, which, in their first road tour in years, held court in the Palais de la Mediterranee.

Crossed journal line  
1/2" - 2 mm  
Journal line grain  
after alteration  
Crosed apatite  
1/2" - 2 mm  
Apatite grain  
after alteration  
Additional copies of this data sheet may be obtained from  
the AMERICAN GEOLOGICAL INSTITUTE, Code No. 10

## TEXAS GEOSCIENTISTS

### Spark Local Educational Council

The Dallas-Ft. Worth metropolitan area scientists and technologists are preparing to do something about the status of sciences and mathematics in the high schools of the area and to study ways and means of developing more interest in science and technology among students with the right combination of aptitudes.

With the Dallas and Ft. Worth Geological and Geophysical Societies leading the way, backed enthusiastically by professional groups from the local aviation industry, a Council of Scientific Societies is being organized as a federation of all local professional groups. Surveys indicate a total of 44 Societies with a local membership of over 11,000 are eligible and interested. This includes Medical and Dental Associations.

While the movement got under way just after January 1, long delays have been experienced in organization, because of the difficulties of drafting a Constitution and By-Laws which forty-odd organizations with their own local and national constitutions, rules, regulations, etc., could legally ratify. Most of these objections have now been overcome—and if any group elsewhere is interested in starting a similar council, we will gladly supply them a copy of the constitution we finally worked out.

We will report next month on the agenda of committees and studies which the board of directors approves as projects. The board is made up of men of outstanding reputation and the approach is strictly along the lines of scientific research into any problem. When reports are approved by the council, we anticipate that we can mobilize local public opinion to back up any recommendations we make. In fact we anticipate a welcome from most of the school boards, since our reports will be authoritative and completely non-political.

## NSF SUMMER INSTITUTES

### August 1 Closing Date for 1959 Requests

The closing date for applications to be submitted to the National Science Foundation for Summer Institute programs for the summer of 1959 is August 1, 1958. The Summer Institute program, designed principally to aid secondary school teachers of science and mathematics, has proven very successful and has been expanded. Departments of Geology, however, have been conspicuous by their lack of participation in the Institute programs despite the great need for better understanding of the geological sciences on the part of science teachers everywhere.

In most instances, the summer institutes involve interdepartmental cooperation. In some cases a day or two has been allocated to geology training. There is a need for an aggressive approach on the part of geology departments to present a well-rounded introduction to geology in these institutes, whether the organizational effort originates with the geologists or the scientists of another discipline.

The geological program need not rely solely on members of the geology faculty. Qualified persons may be brought in as guest lecturers for the Institute programs. As was recently done at Kansas State Teachers College, state geological surveys can be called upon for cooperation in developing lectures and field trips. In other instances local geological societies might be expected to provide supporting efforts in conducting an Institute.

If aid is desired, the American Geological Institute will assist any interested department of geology/geophysics in making application to the NSF for a Summer Institute grant for 1959. The closing date is August 1.

Pictured here are the first of the Swiss stamps featuring minerals, fossils and rocks (see Bob Bates', *Geology in the Public Eye*). They may be obtained for collection purposes from the Philatelic Agency PPT, Bern, Bollwerk 8.





## FACE FACTS *Continued from page 8*

function of the district office, aside from exploitation, is that of gathering information and keeping historical records.

### AT THE CROSSROADS

There has never been such a demand for high scientific standards in geology. Our profession, engaged in exploration, stands at the crossroads. The easily found, obvious oilfields in this country have been found. Finding oil in these days is not accomplished by flashes of genius; it is a tenacious, dogged, often dreary task of assembling and analyzing great masses of small bits of information. Finding oil, like most other scientific enterprises, is one percent inspiration and 99 percent perspiration. These problems are fully realized by the more progressive exploration companies.

Now that the issue has been joined, it might be well to examine all of its many facets. Dr. Maxwell has severely indicted the petroleum industry, and rightfully so, for not insisting on advanced training. However, our colleges and universities and their faculties also bear a major responsibility, which many of them fail to realize. In the first place, it is the opinion of many thoughtful professional men in industry that a four year course in geology for a bachelor's degree is as inadequate as a model T Ford for modern transportation. Many branches of engineering require five years of undergraduate training for a bachelor's degree. Such an innovation in geology would certainly be a major advance.

Secondly, many of our college and university departments do not maintain the high academic requirements so absolutely necessary. As Vice President of the A.A.P.G. last year, I examined over 1,500 applications for membership. Most of them were accompanied by transcripts of college work. I was appalled at many of the grade averages, far too many of which averaged a low C or below in professional subjects. Failures in relatively easy courses in geology were not uncommon. And yet, in most instances, membership applications were sponsored by members of the faculty from the individual's school! Obviously, these are generalizations, and cannot apply to any particular department. However, they are far too frequent. Such individuals should not be admitted to a department as a major, and those who do slip in should be weeded out at the end of the sophomore and junior years.

Thirdly, there is a shocking lack of ap-

preciation of the professional character of a career in geology. Too many men have no appreciation whatsoever of their professional obligations. They are nothing more than job holders, geological clerks, so to speak. Certainly a number of such individuals are necessary to support the dedicated scientist, but in the last ten years we have loaded the profession with such mediocrity. The faculty member has the first contact with the embryonic professional geologist. It is his responsibility to eliminate the unfit; to emphasize the professional character of the work and the necessary dedication to geology as a way of life. We need far better quality and much less quantity to raise our standards to encourage dedicated individuals to enter graduate training.

### FEWER NEEDED—BETTER TRAINED

Far too few of our faculties realize the restricted and limited field of professional geology. As best we can estimate, there are probably 15,000 geologists in the petroleum industry. It seems probable from data gathered, that no more than 1,000 openings for employment are available in any one year. And yet, the May issue of *GEO-TIMES* shows a total of 9,817 students of geology at the junior, senior, and graduate level in the United States. There are 3,511 seniors, 1,760 candidates for master's degrees, and 824 in the Ph.D. program. It would seem to be a fair estimate that perhaps over 3,000 of these men will be seeking employment in a relatively poor year. Half the number of students would seem to be a much more realistic figure, and these men could be given better training, and the quality of our graduates would increase materially. Something is badly out of phase. In many universities, of course, the larger the department, the higher the standing of the faculty, the better the financial reward, and the more facilities and money available; a most unfortunate situation. As a matter of fact, less than a half dozen larger departments graduate more than enough men to fill the available jobs in any one year. This entire situation is grossly unfair to the student and to the profession.

### DEPTH IN FUNDAMENTALS ESSENTIAL

Finally, many of our departments have sacrificed training in the fundamental branches of geology for bread and butter trade school courses that have no business in the curriculum. No matter how capable the staff and how close to industry, a department can never be anything but several years behind current methods and



techniques in the profession. A student's time is far better spent in training in the broad fundamentals and learning to be a geologist first. To be a petroleum geologist, an individual must first be a well trained geologist. There is also an unfortunate tendency inherent in the development of any science to overspecialization. A well rounded exploration geologist is of necessity a general practitioner who must have a broad grasp of the fundamentals of tectonic and structural geology, mineralogy, petrology, stratigraphy, sedimentation, and historical geology.

Many of the universities do not avail themselves of the services of their professional colleagues in industry, when the appearance of such men from time to time lecturing, or in seminars, is highly stimulating and beneficial to the student. I am happy to report that more and more colleges and universities are availing themselves of the services offered by the Distinguished Lecture program of the American Association of Petroleum Geologists. There are now fifty-two departments participating in this program, but this number is less than one fourth of the departments offering undergraduate degrees in geology.

Then we must place a fair share of the responsibility for our lack of well trained men on our professional organizations. These groups do not insist on the high standards of training necessary in a profession to maintain the highest standards. There should be much closer cooperation between the university department and the professional organization; each seeking the help of the other. The American Association of Petroleum Geologists is presently considering ways and means of raising its membership requirements at the junior level, with this goal foremost.

The subject of uniform licensing of geologists has been under consideration for some time. It is a highly controversial question which provokes a storm of debate whenever mentioned. Perhaps, however, the greatest argument for licensing is that it will give the profession some control, through accrediting of colleges and universities graduating men into the profession. The medical and legal professions have succeeded admirably in raising standards through accrediting by their professional organizations. I am one who believes strongly that this is the solution to our problem, and if adopted, will ultimately result in a profession with much higher standards.

This problem of better geologists for industry is not one which can be solved

## DALLAS PROGRAM

### AAPG-SEPM Program Takes Shape

The 44th Annual Meeting of the American Association of Petroleum Geologists and the 33rd Annual Meeting of the Society of Economic Paleontologists and Mineralogists will be held March 16-19, 1959, in Dallas, Texas. Sessions will be held in the new Municipal Auditorium and Theater.

The general themes of the meetings will be:

A.A.P.G. FUNDAMENTALS OF OIL FINDING—*Application of Geology, Geophysics and Economics.* Papers on the following subjects are to be featured:

- Origin and Migration of Oil
- Geology of Fluids
- Recent Developments in Geological Research
- The Future of Geophysical Exploration
- Proper Use of Geophysics in Problem Areas
- Economics in Oil Finding
- Foreign Influences
- Interior Salt Domes
- Offshore Developments
- Stratigraphic Trap Exploration
- Important Basins

The A.A.P.G. Research Committee also is scheduling a symposium and panel discussion on *DIAGENESIS* covering limestone, sandstone, and shale.

S.E.P.M. STRATIGRAPHIC CONCEPTS AND CLASSIFICATION. The Society of Economic Paleontologists and Mineralogists is planning a symposium on Stratigraphic Concepts and Classification in addition to regular sessions which run concurrently with the A.A.P.G.

Technical Program Chairmen: Authors wishing to submit papers should contact the following Committee Chairmen at an early date: for A.A.P.G.: R. E. RETTGER, Sun Oil Co., Box 2880, Dallas, Texas. for S.E.P.M.: W. M. FURNISH, Department of Geology, State University of Iowa, Iowa City, Iowa.

solely by industry, the university, or the professional organization. It is a most serious problem. As we near the end of an era of petroleum prospecting, and face a future full of uncertainty, that future can only be assured through the closest cooperation between all of the entities involved and affected.

## CHALLENGE *Continued from page 7*

Over the next ten years, according to an article in Jersey Standard's publication, *The Lamp*, oilmen expect to drill more than 600,000 wells in the United States alone. They will need to spend \$60 to \$70 billion to develop new resources. This means that producers must risk all the capital they recover from earlier investments (depletion and depreciation), plus about half of all their net income (after taxes), and they must raise substantial sums of money in addition.

Even in 1957 many companies did not generate sufficient capital out of operations to finance expanded programs. These included Standard Oil Company (N.J.), Shell, Sinclair and others.

### OUTLOOK FOR DISCOVERIES IN ROCKY MOUNTAINS

Several years ago (1941 to be exact) a study by the author of the crude oil reserves then existent in the United States indicated that between 50 and 60 percent of the total oil was reservoirized in either stratigraphic traps or combination structural and stratigraphic traps. Since at that time less than 5 percent of the oil in the Rocky Mountains was reservoirized in stratigraphic traps, it was concluded that tremendous reserves remained to be discovered. Time has proved the accuracy of this conclusion.

Not only are the stratigraphic trap possibilities excellent in the Rocky Mountain area, but the general outlook is substantially better than for much of the remainder of the United States. Only one dry hole has been drilled for each 38 square miles of surface sedimentary area in the Rocky Mountains. This compares with one dry hole for each 1.26 square miles of sedimentary area in Oklahoma; 1.9 square miles in Illinois; 4.23 square miles in Kansas; or 6.7 square miles for the entire Mid-Continent area.

According to Petroleum Information, the Rocky Mountain area accounted for approximately one-fourth of all oil discovered in 1957 with only 8.5 percent of the total exploratory drilling effort. They further pointed out that for the second consecutive year total investment in the area exceeded \$1 billion.

Despite the promising outlook for this area we should not overlook the fact that since 1951 exploratory investment in the Rocky Mountain area has consistently exceeded the value of crude oil produced. This situation cannot continue indefinitely.

## REQUIREMENTS

A dependable supply of oil and gas at reasonable prices is essential to both economic progress and national defense.

Our present supply exists because there has been intensive exploration for petroleum reserves. While the supply is adequate at the present time, it appears obvious that unless we are able to step up our finding rate at reasonable costs, it may be expedient to meet the growing oil needs from oil shale, tar sands or from the prolific reserves outside our own border.

### WHAT SHOULD BE DONE

The following are suggestions from the March 7 issue of *Petroleum Week*:

- *Exploration: The need for new tools and techniques has become urgent as oil gets harder and harder to find.*
- *The pace must be quickened—and fast!*
- *Most "easy" oil has been found. It's the remaining 450 billion barrels or so that'll be tough.*
- *The industry has been chipping at the obstacles. Now it'll have to blast.*

If the oil-finding rate in the United States is to increase significantly, radically new exploration techniques will have to be developed. But, unfortunately, no such bold, new methods now appear on the horizon.

The threat of dwindling oil reserves, which are becoming increasingly harder and more expensive to replenish, hangs over the heads of all oil-finders.

Some predict that improvements in existing tools and techniques will help—but not nearly enough to check the declining discovery rate.

One of the major, specific problems facing oil-hunters: to find an easier, more definitive method for determining the location of a buried stratigraphic trap.

Another big goal: to find better ways to interpret geophysical data that's currently obtainable with existing geophysical equipment and logging tools.

Another problem: how can closer cooperation be developed among all the various types of oil-finders?

### THE CHALLENGE TO GEOLOGY

The United States has achieved a position of world leadership in industry in large part because of its ability to attain maximum productivity through the efficient use of manpower.

In 1776 95 percent of our citizens were farmers. They were barely able to grow enough produce to feed themselves and the other five percent. In 1957, as has been the case for several years, less than 13 percent of our population were farmers and we had tremendous surpluses.

In industry as a whole there has been a three percent increase per year in productivity per man hour since before the turn of the century. In recent years this has been brought about largely by assembly-line production, automation and radically new techniques.

While it is possible to install IBM equipment for tabulating well data and to make other improvements, the exploration geologist is not exactly adaptable to assembly-line production or automation. If he is to survive and prosper, it is rather obvious that he must radically improve his individual efficiency.

It is my conclusion that the day of the surface and subsurface geologist using only structure and isopach maps for the finding of oil and gas prospects is almost over.

The successful exploration geologist and geophysicist of tomorrow will be the expert stratigrapher with an abundance of ideas and the creative ability to recognize the obscure but tell-tale signs of an oil or gas field when he sees them.

You may ask, "How can a geologist or geophysicist become a more proficient stratigrapher?" In answer I give you my philosophy of operations. I am a strong supporter of human relations in business. I believe in adequate salaries, job security, excellent employee benefits, recognition of individual effort, opportunities for advancement, training and development programs, and in the decentralization of adequate authority commensurate with responsibility to the Division, District and Area supervisors.

On the other hand, I believe in integrity of the individual, the making of practical decisions, self-discipline, high standards of performance, individual initiative, creative imagination, hiring able men, the weeding out of misfits, and above all, getting results and making a profit.

## *You saw it in GeoTimes . . .*

Bentonite testing is the subject of a new illustrated brochure giving Steel Founders' Society specifications for western bentonite. Available free on request from *Soiltest, Inc.*, 4711 W. North Ave., Chicago 39, Illinois.



## ROCK CHIPS

by SANDSTONE SAM

EPITAPH: Ss (D's T.) Sam and staff  
I've suffered so from printers' errors  
That death for me can hold no terrors.  
No doubt this stone has been mis-  
dated;  
I wish to God I'd been cremated.

A West Coast biology student recently offered this statement: "Fossils occur in sedimentary rocks. There are three kinds of rock: sedimentary, igneous and hermaphroditic."

Sunburned but unharmed after being lost 48 hours in the desert near El Centro, Calif., a geology student admitted he got all mixed up when he concentrated too hard on a map he was making of the area.

Parade, May 24, 1958

FOUND: One pair good-quality sunglasses on the Eureka quartzite in section F-F<sup>1</sup> of Hazzard's stratigraphic sections of the Nopah Range. Also found: A tomato juice can and a vienna sausage can from slightly higher in the same section. Owner(s) may reclaim same by writing to SsS Box 58.

## FOREIGN FIELD RESEARCH

Graduate students contemplating dissertations in subjects with geographical significance involving field studies abroad may obtain financial support under the program being conducted by the National Academy of Sciences-National Research Council. The Division of Earth Sciences, which is administering the program, and the Office of Naval Research, which is supplying the funds, interpret geography in its basic sense to include such fields of study as shore processes, coastal development, stratigraphy and sedimentation of unconsolidated formations, landforms and drainage, mineral economics, and many aspects of pedology, glaciology, palynology, and climatology. The final date for the acceptance of proposals is December 1, 1958 and the results of the competition will be announced no later than January 31, 1959. Information and applications can be obtained by addressing *Foreign Field Research Program, Division of Earth Sciences, 2101 Constitution Avenue, Washington 25, D. C.*



THE POWDER METHOD IN X-RAY CRYSTALLOGRAPHY, by Leonid V. Azaroff and Martin J. Buerger, 342 pp., McGraw-Hill Book Co., 330 West 42nd St., New York 36, N. Y., \$8.75.

Even for the person who uses X-ray diffraction methods only for routine identifications this book is excellent. Facts regarding the technique are stated which, except in the case of the specialist, are usually learned only by word of mouth.

Discussions include basic principles of X-rays and powder photography, instrumentation, interpretation of data, sources of error and inaccuracies, and visual interpretations.

Mathematical treatments are kept to a minimum and are not complicated. Methods for crystallographic indexing of X-ray patterns are simply and thoroughly covered. The illustrations are very good.

R. C. B.

GEOGRAPHY IN THE 20TH CENTURY, Griffith Taylor, editor; 674 pp., 3rd edition, 1957; Philosophical Library, New York; \$10.00.

Twenty-two authors in twenty-eight chapters discuss the various fields of geography. Each chapter serves as an introduction to the problems and techniques of a different aspect of the subject, the emphasis throughout being on its historical development. Each author succeeds remarkably well in presenting his part of the subject in an interesting and provocative fashion.

The book is divided into three parts. The first part deals with the more philosophical aspects. The amount and kind of control which the physical environment exerts on man's activities is discussed in general terms, and a history of the growth of geography and how it has ramified into many branches in the last 200 years is given in outline. The second part is concerned with the problems of special environments such as the tropics and polar lands, as well as in the development of meteorology, soil studies, and land use surveys. In one chapter S. W. Wooldridge reviews briefly the development of geomorphology in the past 100 years and emphasizes its usefulness as a complement to stratigraphy. The last part deals with special fields, such as racial geography, urban geography, the sociological aspects of geography, etc., and includes

chapters on the development of cartography and the use of air photography in the study of geography. A short glossary of 700 terms is included which is not entirely satisfactory, since some of the geological definitions are so concise as to be rather misleading.

J.A.S.

BIBLIOGRAPHY OF NORTH AMERICAN GEOLOGY, 1955, by Ruth Reece King and others, U.S. Geological Survey Bull. 1065, 1958, 511 pp., Supt. of Documents, U. S. Gov't. Printing Office, \$1.75.

This is the third North American bibliography volume to be announced in recent months. The Survey finally appears to be geared to prompt production of this all-important bibliographic service.

BASIC PRINCIPLES OF PARLIAMENTARY LAW AND PROTOCOL, by Marguerite Grumme, 68 pp., available from Marguerite Grumme, 3830 Humphrey St., St. Louis 16, Mo., \$1.00

This handy, easy-to-follow, pocket-size guide to parliamentary procedure will prove helpful to presiding officers of societies large and small. The author is a widely recognized registered parliamentarian.

SUGGESTIONS TO AUTHORS OF THE REPORTS OF THE U.S. GEOLOGICAL SURVEY: 5th Edit., 1958, 255 pp., Available from the Supt. of Documents, U. S. Govt. Printing Office, \$1.75.

This publication is an important guide manual to anyone who prepares geologic reports in that it provides many guides to clear, correct usage.

CONCISE INTERNATIONAL DICTIONARY OF MECHANICS AND GEOLOGY, by S. A. Cooper, 1958, 400 pp., Philosophical Library, 15 E. 40th St., New York, \$6.00.

This dictionary lists French, German and Spanish equivalents of English terms. The terms are also alphabetized in each of these languages for cross reference. The coverage of geologic terms is far from complete, but the dictionary would prove particularly useful to the economic geologist.

---

### *You saw it in GeoTimes . . .*

Fluorescent House, Branford, Connecticut, has recently issued a catalogue of fluorescent minerals. The catalogue has an attractive cover in color.

# LETTERS



DEAR ED:

The June GEO TIMES has a lovely cover, but I was horrified to read under "Our Cover" that someone has moved the Devil's Tower from Wyoming into South Dakota. When last I saw the Tower it was a good 30 miles west of the South Dakota line. Probably some one of those South Dakota tourist resorts felt it needed some added attraction, and hauled our Tower off. We are now organizing a Sheriff's posse to go up and retrieve it.

Sincerely,  
HORACE D. THOMAS  
Wyoming State Geologist

DEAR SANDSTONE SAM:

You and your desk-bound associates on the staff of GEO TIMES pulled the "rock" of the year. Enclosed is a buck to buy a cheap road atlas so you can keep things straight. Maybe you can't read a map. If so, how could you be so wrong on the location of Devil's Tower? The hills are the Bear Lodge Mountains,<sup>(1)</sup> the county is Crook, the state is Wyoming, and the spot is more than 30 airline miles west of the Wyoming-South Dakota state line.

Maybe you ought to join me for a few months in the boondocks to regain your senses.

(1) *Hammond's Ambassador World Atlas.*

Your old buddy,

WAMSUTTER WILLIE

Dear Willie:

*You'll never know whether we meant it that way. This was a reader survey stunt and believe me GEO TIMES is read—even down to the six point type.*

Sss

DEAR EDITOR:

I don't know who your book reviewer "J.F." is, but the last sentence of the review of the "General Geology Laboratory Workbook" in the May "GEO TIMES" indicates a rather common degree of confusion with respect to shoreline analysis. Most modern textbooks of general geology that are unbiased indicate some difference of opinion as illustrated by Emmons, et al, in which one finds Johnson's classification side by side with Shepard's. No careful student refers to submergence and emergency as submerging and emerging as does "J.F." The fact that Shepard's terms

primary and secondary were published after Johnson's classification does not mean that they are more up-to-date and accurate. It is too bad that reviewers sometimes find it difficult to avoid slanting their reviews by their own opinions.

Sincerely yours,  
JOHN B. LUCKE,  
Univ. of Connecticut

DEAR EDITOR:

If geology is going to get anywhere in this space age, it is going to have to get into orbit. Research takes money. The only real research money available today is for space research. If you can't lick 'em, join 'em! Let geologic research become solid space research, oceanography—liquid space. The third state of space is just so much air.

A friendly suggestion from  
cloud seven

DR. LIVINGSTONE

DEAR EDITOR:

This is not too late, I hope, to thank you for mention of my book *Mining Round The World* in your issue of October, 1957. Your coverage of good reading concerning mining and related subjects is always impressive and valuable. I know of no other such coverage.

If possible, I would like very much to receive an extra copy of the issue of GEO TIMES which had an account of the Ontario Science Teachers Mine tour. It would be in the January issue, or late in 1957. I hear a good deal of trying to interest young people of high school age in science and this tour certainly seemed like a novel and most effective approach.

Again, thank you very much for mention of my book in your magazine.

Very truly yours,

JUNE METCALFE

DEAR SIR:

As a recipient of GEO TIMES through my membership of several American geological societies, may I congratulate all concerned on making GEO TIMES the success it so obviously is. At last it appears geologists are pooling their efforts to face up to their responsibilities in this expanding technological age. I have always felt that geologists lacked "popular" media for the interchange of ideas, and publicity. This seems to measure up to the requirements,

and is very useful to geologists in Australia who lack the opportunities for free interchange that you enjoy in North America.

For your information I am forwarding back numbers of our own small effort in a comparable field—the *Australian Amateur Mineralogist* which I think could be of interest to some of your readers. We have produced this magazine more as an educational guide to the many persons who have little opportunity to learn of the wide interests in geology. Already we feel we are drawing together many “embryo” geologists, etc., who may never have the opportunity otherwise. I don’t think there is any harm in popularizing geology, if we are going to select the best available talent from our younger generation for fuller training.

Again my congratulations to the producers and contributors to *GEO TIMES*.

Yours faithfully,

REG C. SPRIGG  
Managing Director  
Australian Amateur Mineralogist

Ed: You can subscribe to the *Australian Amateur Mineralogist*, a fine little quarterly magazine, at a rate of 12/6 by writing 57 Todville St., Woodville West, South Australia.

DEAR EDITOR:

In these days of Sputniks and the rivalry to be first in orbit with the biggest, we acknowledge our indebtedness to you for selecting out of your presumably over supply of material and for allocating into your obviously short supply of space Peg M’Tite’s delayed citation of G.S.A. as first in orbit (February 1958) with an uninformative abstract! We share the distinction with our two authors, two critical readers and two editors.

May we hope to capitalize our “goof” and as dividends therefrom draw ever better and more informative abstracts!

In all fairness we must cite John Rodgers, our esteemed counterpart in *AJS*, as first in orbit with the “needle” though graciously, promptly and privately. Nevertheless, to Peg M’Tite we extend thanks for the wider publicity on behalf of better abstracts and acknowledge implied gratitude for having saved him from a blot on his escutcheon.

With sincere thanks to you, Peg, and to you, Steve, we are

Yours for better abstracts,

Agnes, Barbara, Marcia, Henry  
GEO-SOC-AMITES

DEAR EDITOR:

Your letter of February 7, 1958 (*GEO TIMES*, March 1958) to Dr. James R. Killian, Scientific Advisor to the President, Secretary Seaton, Senator Murray, Congressman Engle, and Chairman Ellsworth of the U. S. Civil Service Commission is an excellent presentation of the facts. It was my privilege, while in India last May, to discuss with Dr. Movlianov Gani, Professor of Hydrogeology at the University of Tashkent and Director of the Academy of Sciences of the Uzbek Soviet Republic, the status of ground-water studies in the U.S.S.R.

Dr. Movlianov stated that hydrogeology is by far the most important phase of geological study in Uzbekistan, where ground-water supplies for irrigation are obtained from loess deposits up to 300 meters in thickness. Five of the 10 geology professors at the University of Tashkent teach hydrogeology, and there are 25 hydrogeologists (including the 5 professors) engaged upon research studies in the Uzbekistan Academy of Sciences. About 30 hydrogeologists are graduated each year from the University of Tashkent, and all are assigned to a 15-year state-wide investigation upon which more than 200 hydrogeologists are now engaged.

The trained hydrogeologists in the Uzbek Soviet Republic alone, according to these figures, number more than 230 at this time. How many there are in the remainder of the U.S.S.R. is not known. The total number of professional ground-water geologists in the Ground Water Branch of the U.S. Geological Survey in January 1958 was 270. Few of the new appointees have received formal training in ground-water hydrology, and it will be several years before they are well trained specialists. Ground Water Engineers in the Branch number 77 and many of these are competent geologists within their areas of assignment. Thus, in one field of geological specialization, at least, we have good evidence that the Russians are far advanced and making rapid progress.

Regarding Dr. Movlianov’s general competence I was profoundly impressed, although I was somewhat surprised by his lack of knowledge of the application of borehole geophysics in ground-water hydrology. He was anxious to talk and exchange ideas, although the Russian Consular Agency interpreter frequently refused to translate his thoughts for me.

Dr. Movlianov was really amazed to learn the details of the annual financing arrangements for the work of the U.S. Geological



Survey, and could hardly understand how such a method might work. It would appear that we must, indeed, increase our efforts and embark upon soundly-financed long-range programs with good continuity if we are to maintain a position of leadership in the geological sciences.

Very truly yours,

PAUL H. JONES

GENTLEMEN:

Thank you very much for "GEO TIMES" Vol. II, No. 10, I received yesterday.

I am a charter member of the Geochemical Society. My dues 1957/1958 are paid. I should like to know if I shall get GEO TIMES clear of all charges and regularly as a member of "Geochem. Soc."

GEO TIMES is a very interesting magazine and I should be glad to have it in future.

With best wishes, I am,

Sincerely yours,

GUENTHER SCHNEIDER  
Leipzig, Germany

Ed: All overseas members of the Geochemical Society have now been added to the GEO TIMES mailing list.

## INTERNATIONAL GEOGRAPHICAL CONGRESS

Stockholm  
August 6-12, 1960

The XIXth International Geographical Congress to be held in Stockholm, August 6-12, 1960, has been announced recently in the First Circular which appeared in the *IGU Newsletter*.

As with the International Geological Congress (Copenhagen, August 15-25, 1960), the five Nordic countries—Denmark, Finland, Iceland, Norway and Sweden—will act as hosts. The program will concentrate on subjects pertinent to the Nordic countries and will include meetings of the IGU Commissions. Special emphasis will be put on symposia and excursions.

Some persons may want to attend both the Geographical Congress in Stockholm and the Geological Congress in Copenhagen. Travel service provided through the European Traveling Seminar with which the AGI is maintaining liaison will be sufficiently flexible to facilitate such plans.

The First Circular and Application Forms for the Stockholm Congress may be obtained by writing *International Geographical Congress, Postfach, Stockholm 6, Sweden*.

**Edie BAUER**

**Down**  
**MUMMY BAGS**

TWICE as WARM as any other insulation known to science.



Why carry pounds when ounces are warmer?

*Kara Koram*

ORDER  
BY  
MAIL

Used by Himalayan expeditions. 4-Point "V" Type Laminated tubular construction with 100% prime Northern goose Down insulation.

**COMFORT RANGE: zero to 65° above**

No. 400, Std. Size \$49.95. Down 2 3/4 lbs., wt. 5 3/4 lbs.

No. 400L, Large Size\* \$54.95. Down 3 lbs., wt. 6 lbs.

**COMFORT RANGE: 20° below zero to 60° above**

No. 401, Std. Size \$54.95. Down 3 1/4 lbs., wt. 6 1/4 lbs.

No. 401L, Lg. Size\* \$59.95. Down 3 1/2 lbs., wt. 6 1/2 lbs.

\*Large size for persons over 6 ft. tall.

ADD \$1.50 FOR SHIPPING

**FREE**  
**64-PAGE**  
**CATALOG**

The lightest, warmest things on earth. 100% down insulated clothing, sleeping bags, insulated underwear, etc. Scientific facts about insulations. Send for your copy TODAY!

**Edie BAUER**

SEATTLE 4, WASHINGTON DEPT. 6

## NEW YORK STATE

Rules on  
Professional Status  
of Geologists

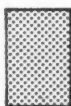
A recent decision of the New York State Tax Commission recognizes that the science of geology is a profession and consulting geologists in the state consequently are relieved of the responsibility of filing an "Unincorporated Business Tax Return." One New York firm of consulting geologists required to file such a tax return since 1948, protested that the practice of geology deserved the same professional status as physicians, lawyers and others who were considered exempt from filing of the unincorporated business tax return.

Informal hearings began in 1954 in an effort to establish the professional status of the geologist. In May 1957 the American Geological Institute was asked to submit evidence to support this contention and did so. It was recently learned that the Tax Commission has ruled that geology is a profession and that geologists in New York State who derive more than 80 per cent of their gross income from professional services and whose activities are such that capital is not a material income-producing factor, are not required to file the Unincorporated Business Tax Return.

# GEOTIMES

*serves the geological sciences . . .*

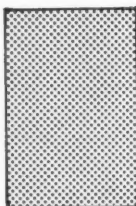
ADVERTISING IN GEOTIMES COSTS SO LITTLE



1/4 page can cost less than 0.27¢ per reader



1/2 page can cost less than 0.47¢ per reader



a full page can cost less than 0.86¢ per reader

## JUNE 1958 CIRCULATION

New England	765	E. South Central	794
Middle Atlantic	2,388	W. South Central	10,319
E. North Central	1,964	Mountain States	4,571
W. North Central	1,636	Pacific States	3,991
South Atlantic	2,185	Canada	1,578
	Foreign		2,493
Total June 1958 Circulation		32,684	

Write for details TODAY

GEOTIMES  
2101 Constitution Ave., N.W.  
Washington 25, D. C.

## CLASSIFIED ADS . . .

No. of times	Rates per line per insertion			
	1	2	4	8
POSITIONS WANTED	...\$0.50	\$0.30		
VACANCIES	.....1.50	1.00		
SERVICES-SUPPLIES	.....2.25	1.50		
CONSULTANTS	.....2.25	1.50		
ONE INCH BOX	.....25.00	22.50	21.25	20.00

No discounts. AGI Box Number \$2.00 extra. Minimum charge \$2.00. All classified advertisers will be billed, do not send advance payment. Address all communications to AMERICAN GEOLOGICAL INSTITUTE, 2101 Constitution Ave., N.W., Washington 25, D. C. Rates effective July 1, 1958.

### VACANCIES

**VISITING LECTURER, GEOPHYSICS.** March 15-June 15, 1959, or part thereof. Recognized authority on any phase of earth or exploration geophysics, preferably of broad general interest to geologists and/or geophysicists. Substantial honorarium. Recommendations solicited. Address Prof. Harold Mooney, Dept. Geophysics, Univ. Minnesota, Minneapolis.

**GEOLOGIST.** Do to research in sedimentary terrain and part-time teaching. Small organization needs man with enthusiasm and broad interests. Some graduate training required. May arrange working hours so as to permit work on Ph.D. Salary dependent upon qualifications. Write Delaware Geological Survey, University of Delaware, Newark, Delaware.

**ANTARCTIC POSITIONS** in geophysics and glaciology for austral winter 1959, summer 1959-60. Salary range \$6,000 to \$10,000 plus isolation allowance, food, clothing. Send education and experience resume to Committee on Polar Research, National Academy of Sciences, 2101 Constitution Ave., N.W., Washington 25, D.C., Attn: R. C. Peavey, Executive Secretary.

**WOMAN** with degree in geology wanted as assistant in Geology Division. Familiarity with invertebrate fossils and minerals important. Ability and willingness to do clerical and routine work desired. Send application to: Ward's Natural Science Est., Inc., P.O. Box 1712, Rochester 3, New York.

**PROFIT SHARING** and small salary offered by firm to experienced photogeologist trained in photogrammetry. Must be under 35, aggressive and interested in building sales. Box 94.

### RESEARCH GEOPHYSICIST

To conduct original research, both theoretical and experimental, in problems of elastic wave propagation and related data processing techniques. Ph.D. or equivalent in physics, geophysics or related field. Strong background in mathematical physics required. Experience in exploration seismology research helpful, but not required. Salary open. Our staff is aware of this advertisement. Send complete resume to Box 93.

### POSITIONS WANTED

**BOX 398. WHO NEEDS A** 29 year old, married exploration geologist with varied mineral deposit experience who can write? Has written articles and reports for all levels of geological interest and knowledge. Open to any attractive offer.

**BOX 417. GEOLOGIST, 35, Ph.D.** in June 1958, B.S. in Electrical Engineering, experience with U.S.G.S. Desires teaching position in college or university, preferably in western U.S. Interested principally in structural geology and stratigraphy.

**BOX 429. MINERALOGIST-GEOLOGIST, Ph.D.** Seeks teaching position with opportunities for research and professional growth. Major interest: mineralogy and crystallography. Experience: field work, 1½ years; teaching, 2 years; research (X-ray diffraction analysis) 2 years. Available: Fall, 1958.

**BOX 464. GEOLOGIST, 23, married, B.S.** in June, 1958. Interested in all phases of Geology. Desires position either in or outside U.S. where hard work leads to advancement. Resume on request.

**BOX 476. GEOLOGIST, BS, new graduate.** Two years Kelsh experience. Interested in photogeology position. Some field experience.

**BOX 481. RESEARCH PETROLEUM GEOLOGIST-STRATIGRAPHER, 30, M.S.** Extensive experience in most provinces U.S. and Canada. Have utilized newer exploration tools: Entropy Lithofacies mapping, Gamma-Halo surveys, porosity maps, moment maps, etc. Desire position of responsibility in research or exploration. Executive ability.

**BOX 483. PETROLEUM-GEOLOGIST, M.S.** 30. Diversified experience: subsurface, research, teaching. Knowledge of Texas, mid-cont., Rocky Mts., Appalachian, Canada. Creative thinker, aggressive, proven oil finder, capable of organizing or operating exploration or research group. Desire domestic or foreign position of responsibility.

**BOX 485. GEOLOGIST, 34, single, experienced** in Mining, Field Work, Geophysical Exploration, Drafting (Oil), Mechanical Engineering (Mining Equipment) and Laboratory Work. Prefer foreign work in the nature of Mining, Exploration, Development or Teaching. Total experience about 9½ years. A.B. degree and some post graduate work.

**BOX 487. GEOLOGIST, GEOPHYSICIST, B.S., 28, family.** Desire permanent position as geologist or staff geophysicist. Background: one year in geology, three years in geophysics, and eight summers of oil field work during school years. Presently employed.

**BOX 490. "GENERAL PRACTITIONER"-GEOLOGIST, Ph.D.** Desires professorship or research position. Experienced in petroleum, groundwater, ore deposits, surface and subsurface geologic techniques and geophysics. Some engineering background.

**BOX 493. EXPERIENCED GEOLOGIST, age 50, Ph.D., married.** Executive, administrative and teaching abilities—welcomes opportunity to ORGANIZE GEOLOGY DEPARTMENT for expanding college. Commercial and academic background in both "hard" and "soft-rock" geology. Now consultant.

**BOX 494. GEOLOGIST, Ph.D., specialist** in Economic Geology, Petrography, Mineralogy, Tectonics, Mineralography and Microchemistry; widely travelled, familiar with geologic literature, and with long experience in teaching earth sciences. Seeks position with a good university or a serious small college. Will also consider research or exploration work. Excellent references and available after July 1, 1958.

**BOX 495. GEOLOGIST, Ph.D.** Extensive commercial and major university teaching experience. Desires teaching position: SEDIMENTOLOGY, SEDIMENTARY PETROLOGY, GROUNDWATER, PETROLEUM GEOLOGY and EXPLORATION GEOPHYSICS.

**BOX 498. GEOLOGIST, Ph.D., 34, married,** desires permanent teaching career. Background in sedimentation, sedimentary mineralogy and geochemistry, petroleum geology, principles of stratigraphy. Presently employed as research geologist by major oil company. Two years' teaching experience in small university. Available September.

BOX 499. GEOLOGIST, MS., 24, married, 2 years' teaching experience as graduate assistant, some museum and editorial experience, 1 year with Arizona State Land Department. Qualified for either oil or mining industry. Desires industrial or teaching position. Available September, 1958. Resume on request.

BOX 500. GEOLOGIST, M.S., married, 3 years subsurface experience in Montana and No. Dakota, some photogeology. Interested as petroleum geologist or instructor.

BOX 501. GEOPHYSICIST-GEOLOGIST, 29, extensive experience in Gulf Coast, B.S. Geology, 5 years seismic experience, 1 year coordinating, will relocate. Desires job as district geophysicist or similar position.

BOX 502. GEOLOGIST, experienced explorationist with diversified background needs more responsible position.

BOX 503. PALEONTOLOGIST-STRATIGRAPHER, Ph.D., 29, family, 3 years teaching, 2 years field and mining geology. Desires permanent position teaching invertebrate and micropaleontology, stratigraphy and sedimentation.

BOX 504. GEOLOGIST, 43, Ph.D., family, domestic and foreign training. Broad experience in all fields of Geology and university teaching. Speaks and writes several foreign languages. Desires teaching position in college or university. Available September 1958.

BOX 505. ENGINEERING GEOLOGIST, BA, 26, married, family, 3 years' experience flood control & military projects; planning, surveys, subsurface investigation, supervision, materials, ground water, report writing, legal, estimates. Available in Fall, U.S. or overseas. Position with responsibility preferred.

BOX 506. ECONOMIC GEOLOGIST, Ph.D., 41, employed producing mine, wishes position teaching economic geology, mining geology, petrology or mineralogy. Broad base metal, gold mining, and exploration experience all parts Canada.

BOX 507. GEOLOGIST, M.S., Ph.D., residence requirements completed, dissertation partially completed, 29, married. Six years' experience in research, photogeology, surface and underground mapping, and exploration for rare metals, uranium, and iron. Seeks responsible industrial position; available upon reasonable notice.

BOX 508. GEOLOGIST, BA, 26, family, expects MA in Aug. 58 with thesis in glacial stratigraphy, but interested in all phases of geology, especially mapping. Resume on request. Available immediately.

GEOLOGIST, M.S., 27, seeks teaching position, part-time or full-time, in geology or physical geography, within fifty miles of Boston. M. H. Francis, Trinity College, Hartford 6, Conn.

BOX 509. ENGINEERING GEOLOGIST, Ph.D., 40. Broad experience General and Engineering Geology, Ground Water, Nonmetallics, Structural Geology; also 4 years university teaching same. Excellent references, many publications, active research. Seeks teaching position university or engineering college, esp. to offer courses engineering geology field.

## CONSULTANTS

### E. J. LONGYEAR CO. Geological and Mining Consultants Photogeology

76 South 8th Street.....Minneapolis, Minn.  
Graybar Bldg.....New York 17, N. Y.  
Colorado Bldg.....Denver 2, Colo.  
Shoreham Bldg.....Wash. 5, D. C.  
77 York Street.....Toronto, Ont.  
129 Ave. de Champs-Elysees.....Paris, France  
Zeekant 35.....The Hague, Holland

## THE GEOPHOTO GROUP

Denver, Colorado - Calgary, Alberta  
Tripoli, Libya

WORLD-WIDE  
PHOTOLOGICAL EVALUATION  
AND  
DETAILED SURFACE MAPPING

## GEOPHYSICAL SURVEYS

LAND and UNDERWATER DOMESTIC and FOREIGN

FOUNDATIONS  
GROUND WATER  
SITE INVESTIGATION

WESTON GEOPHYSICAL ENGRS INC.  
PO BOX 306 WESTON 93, MASS.

## SERVICES & SUPPLIES

WANTED TO BUY: Geological and other Scientific Journals. Geo. Ashley, 27 E. 21, N. Y. 10, N.Y.

GEOLOGICAL LITERATURE, scientific journals, U.S.G.S. publications. Bought & sold. Canner's Inc., Boston 20, Mass.

TRANSLATIONS of Earth Sciences materials undertaken. Russian-German-English. Eugene Bluzmanis, geologist, 633 So. 14th Street, Lincoln 8, Nebraska.

## SPRAGUE & HENWOOD, INC.

Drilling Services  
Foundation Investigations Test Boring  
Grout Hole Drilling and Pressure Grouting  
Diamond Core Drilling

221 W. Olive St., Scranton, Pa.  
New York, Philadelphia, Pittsburgh, Atlanta  
Grand Junction, Colorado  
Bachans, Newfoundland

## BERRY THIN SECTIONS

offering  
YEARS OF EXPERIENCE DEPENDABLE SERVICE  
UNPARALLELED QUALITY REASONABLE RATES  
Petrographic thin sections made to your specifications from cores, drill cuttings, sedimentary or metamorphic materials. Satisfaction guaranteed.

CECIL J. BERRY  
1326 W. 12th Street Santa Ana, Calif.

## LEARN AT HOME — MAKE JEWELRY

PROFESSIONAL  
"KNOW-HOW"  
FREE  
ON  
FASCINATING  
PROFITABLE  
HOBBY

CUT GEMS . . . MAKE JEWELRY  
PIECES FOR FUN — FOR PROFIT!  
Start today . . . get acquainted with  
the most thrilling hobby ever devised  
— LAPIDARY. Learn to make expert,  
professional-type rings, bracelets,  
jewelry in your own home.  
SEND for our FREE 16-page booklet  
. . . detail data from the nation's leading  
suppliers to the trade. NO OBLIGATION

Write today to:  
GRIEGER'S, 1633 E. Walnut, Pasadena 28, Calif.

## Chemists for the Industry

### ANDREW S. MCCREATH & SON, INC.

Analytical Chemistry Spectrography  
X-ray Diffraction Cargo Sampling  
Coal Analysis Physical Testing  
Differential Thermal Analysis

236 Liberty Street, Harrisburg, Pa., U.S.A.

**GEOLOGY - GEOCHEMISTRY - GEOPHYSICS**  
**GEOCHEMICAL TESTING SERVICE**  
**AERIAL PHOTOGRAPHY AND MAPPING**  
**JAMES W. SEWALL COMPANY**  
**OLD TOWN, MAINE**

#### THIN SECTIONS

Petrographic thin sections made from your cores, core chips or sedimentary or metamorphic outcrop samples. Careful attention to individual orders. Quality workmanship. Satisfaction guaranteed. Reasonable prices. Price list on request.

**CAL-BREA, P. O. Box 254**  
**BREA, CALIF.**



#### SUBSURFACE EXPLORATION

*"We look into the Earth"*  
**Pennsylvania Drilling Company**  
**Pittsburgh 20, Pa.**

#### d. m. organist

**Petrographic Laboratory**  
**Box 176, Newark, Delaware**

Thin sections of  
 rocks, minerals, ores, ceramics  
 oriented sections  
 grain counts



64" x 40"—11 colors—durable Vinylite

See and feel the mountains, valleys, molded in sturdy plastic. Realistic 3-dimensional effect. Lithographed in 11 blending colors. Shows over 2,000 cities, 600 rivers, 300 national parks and monuments, many lakes, mountain ranges and peaks.

64 x 40 in. Scale 1" = 50 miles. Self framed, hangs easily anywhere. Weighs only 2 1/4 lbs.

Striking, unusual map for den, library, game room or office. A handsome gift. Lends new meaning to travels.

Price, \$45, f.o.b. Phila. Write for information on other AERO maps.

#### AERO SERVICE CORPORATION

Dept. 5-9, Philadelphia 20, Pa.

*Stratex* spec' for scientists!

#### FOR FORESTERS— ASTUTE ANALYSES WITH TRANSCENDENT IMAGE DETAIL—



37A Mirror-Prism Stereoscope \$225.00  
 37B Stereo Binoculars 4x for \$167.50  
 (USA Prices)

Field scientists, worldwide, appreciate stereo brilliance, wide field of STRATEX mirror-prism stereoscope (Fed. Spec. No. ES-42-65U). Featherweight, a shade over 25 lbs., its precision is measurable in Angstroms. Unity magnification. Crisp 4x magnification with optional binoculars. Carrying case included.

#### THE POCKET STEREO THAT'S ALWAYS READY

No. 37 Pocket Stereo—  
 \$12. USA



Field photo plotting on aerials is a cinch with this mighty midget! Snuggles into your shirt pocket—weighs just 5 oz.—has unbelievable brilliance. Leather case, of course. (Fed. Spec. No. ES-42-87).

STRATEX Instruments (a division of the Edmund Scientific Company)  
 8515 Sunset Blvd., Los Angeles 26, U.S.A.  
 Factory Showrooms if your Dealer's out of stock

**STRATEX INSTRUMENT CO.**

8515 SUNSET BLVD. LOS ANGELES 26, U.S.A.

## OPTICAL BUYS

Fine, American-Made Instrument  
 at Over 50% Saving  
**STEREO MICROSCOPE**



Up to 3" Working Distance  
 —Erect Image—Wide 3  
 Dimensional Field

Efficient STEREO MICROSCOPE at low cost. 2 sets of objectives on rotating turret. Standard pair of wide field 10X Kellner Eyepieces give you 23 power and 40 power. A low reflection coated prism erecting system gives you an erect image—correct as to right and left—clear and sharp.

Helical rack and pinion focusing. Precision, American model 10-DAY TRIAL . . . complete satisfaction or your money back.

Order Stock No. 85,856-EH

Full price: \$99.50 f.o.b. Barrington, N. J.

Low Power Supplementary Lens Attachment for above Stereo—provides 15X down to 6X with clear, extra large 1 1/2" field at 6X.

Stock #30,276-EH. . . . . \$7.50

Order by Stock No.—Send check or M.O.  
 Money Back Guarantee

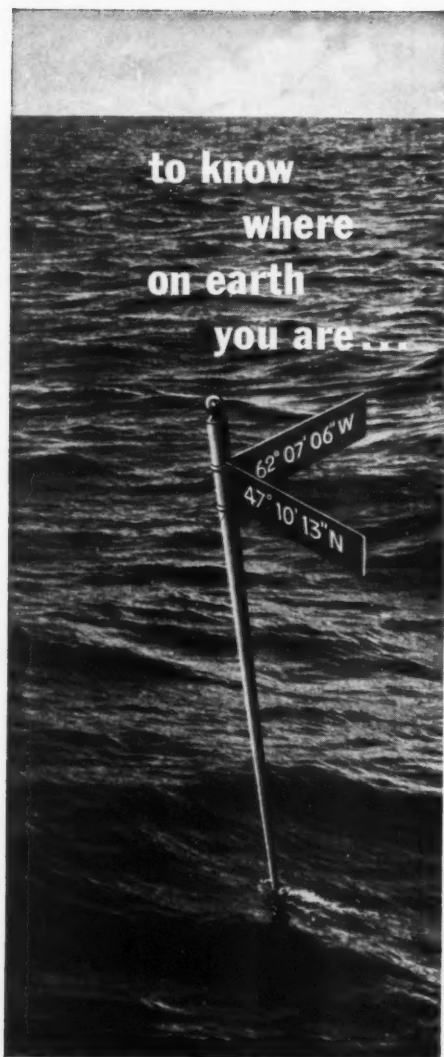
#### WRITE FOR FREE CATALOG-EH

America's No. 1 optical source for geologists, experimenters, hobbyists. Bargains galore . . . War Surplus—Imported—Domestic! Microscopes, Magnifiers, Illuminators, Telescopes, Infrared Sniperscopes and parts, Prisms, Lenses, Reticles, etc.

Write For Free Catalog-EH

EDMUND SCIENTIFIC CO., Barrington, New Jersey





to know  
where  
on earth  
you are ...



Knowing exactly the position of a boat or aircraft at a particular instant or finding your way out to some designated point in the middle of the Gulf of Anywhere sometimes turns out to be the hardest part of the job the vessel was sent out to do.

That's where Fairchild's Shoran can be a help. For Shoran provides an instantaneous, continuous reading that can give a fix within a very few feet. And the continuous feature means that a pilot or navigator can watch a pencil as it automatically moves across a map at any convenient scale and correct his course as he goes. In the office later the pencilled track provides a permanent record of where the vessel was at every important moment. Result: jobs on water or over water positioned with accuracy and ease.

Our Electro-Fix department specializes in providing accurate positioning with electronic devices used the world over for precise geodetic work; Shoran is just one of them. If you have a positioning problem on land, sea or air, call Fairchild first.



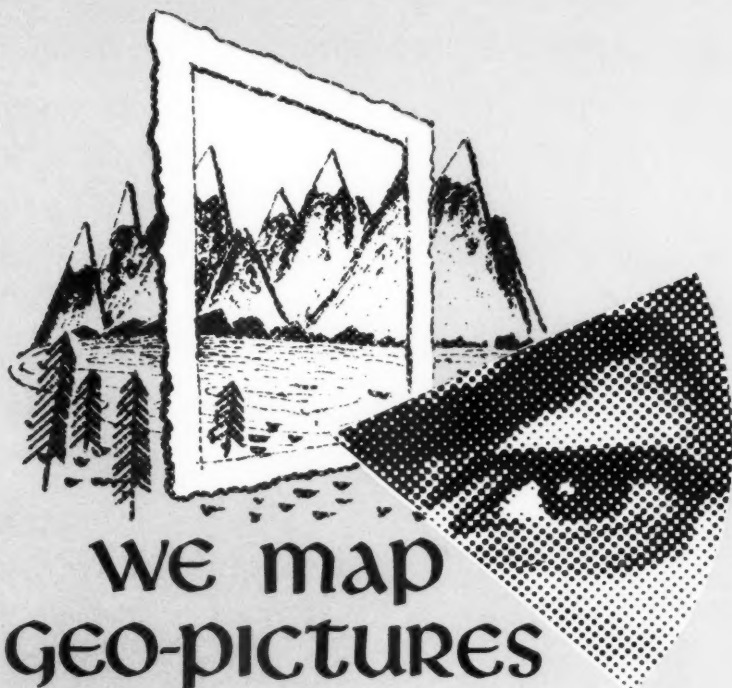
Los Angeles: 224 East 11th Street

OFFICES IN NEW YORK • CHICAGO • BOSTON • BIRMINGHAM • HOUSTON • TALLAHASSEE • SHELTON, WASH. • GENEVA  
BRUSSELS • ISTANBUL • VANCOUVER, B.C. • TORONTO • HAVANA • GUATEMALA CITY • CARACAS • BOGOTA • LIMA  
LA PAZ • RIO DE JANEIRO • BUENOS AIRES • SANTIAGO









## WE map GEO-PICTURES

Williams & Heintz skilled map specialists can take on your "geo-picture" at any point (including the rough field note stage) and still produce a finished professional map for you. Our cartographic services now include preparation and/or collection of base maps, drafting, engraving, scribing, color plate preparation and lithographing. We provide cost estimates and professional cartographic consultation on a *no obligation* basis. Call LI 3-7140 or write—it will be a pleasure to talk over your next map job with you.

### *Williams & Heintz*

WILLIAMS & HEINTZ LITHOGRAPH CORPORATION  
220 EYE STREET, NORTHEAST, WASHINGTON, D. C.

GEO TIMES  
2101 Constitution Ave.,  
Washington 25, D. C.  
Return Postage  
Guaranteed.

## EARTH for the Layman



AGI Report 2

# popular geology



# careers

EARTH FOR THE LAYMAN by Mark Pangborn, Jr.  
68 pages, 1957, \$1.00

An annotated list of more than 1,400 selected popular books and pamphlets on geology and related subjects. Intended primarily to guide and stimulate reading of youth and layman, this book will also prove helpful to the professional geoscientist.

SHALL I STUDY GEOLOGICAL SCIENCES? Free on individual request. \$0.10 per copy in quantity.

A guide to careers in geology and geophysics. Explains the role of the professional geoscientist in our world today.

## AGI Publications

GLOSSARY OF GEOLOGY AND RELATED SCIENCES, J. V. Howell, Coordinating Editor, 325 pages, 1957, \$6.00.

DIRECTORY OF GEOLOGICAL MATERIAL IN NORTH AMERICA, Second Edition, 1957, by J. V. Howell, A. I. Levorsen, with Robert H. Dott and Jane W. Wilds of the AAPG, over 300 pages, cost \$3.00.

AGI REPORT 11, 1956-57 Edition "DEPARTMENTS OF GEOLOGICAL SCIENCES IN THE EDUCATIONAL INSTITUTIONS OF THE U. S. AND CANADA." 196 pages, 1957, \$1.50.

AGI REPORT 12, 1956 Edition, "SURVEY OF GEOLOGY-GEOPHYSICS STUDENTS IN THE COLLEGES AND UNIVERSITIES OF THE U. S. IN 1955-56 AND OF AVAILABLE SCHOLARSHIPS, FELLOWSHIPS, ASSISTANTSHIPS, ETC." 1956, \$0.50.

AGI REPORT 12, 1957 Edition, "SURVEY OF GEOLOGY-GEOPHYSICS STUDENTS IN THE COLLEGES AND UNIVERSITIES OF THE U. S. AND CANADA IN 1956-57," \$0.50.

Order from  
**AMERICAN GEOLOGICAL  
INSTITUTE**

2101 Constitution Ave., N.W.  
Washington 25, D. C.

PAYMENT MUST ACCOMPANY ORDER

r

y

Jr.

400  
on  
ded  
ting  
also  
geor

in-

ity

ics

elist